No. 17-269

In The
Supreme Court of the United States

STATE OF WASHINGTON,

Petitioner,

v.

UNITED STATES OF AMERICA, ET AL.

Respondents.

ON WRIT OF CERTIORARI
TO THE UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

JOINT APPENDIX – VOLUME I OF III

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PETITION FOR CERTIORARI FILED AUGUST 17, 2017
CERTIORARI GRANTED JANUARY 12, 2018

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01-16-2001	RESPONSE TO REQUEST FOR DETERMINATION re: culverts by Interested Party USA in 2:01-sp-00001 request [1-1] in 2:01-sp-00001 (NS) (bz). (Entered: 01/17/2001)
01-20-2001	NOTICE OF JOINDER by plaintiff Muckleshoot Indian Tribe in 2:01-sp-00001 in Request for Determination filed by tribes on 1/12/01; service attached -- svc. by mail on 1/12/01 (NS) (bz). (Entered: 01/22/2001)
03-16-2001	STATE OF WASHINGTON'S ANSWER, CROSS AND COUNTER REQUESTS

	FOR DETERMINATION by defendant Washington State of in 2:01-sp-00001; crsclm against Interested Party USA in 2:01-sp-00001; cntclm against Tribes (Suquamish Indian Tribe, Jamestown S'Klallam, Lower Elwha, Port Gamble Band Clallam, Nisqually Indian Tribe, Nooksack Tribe, Sauk-Suiattle Tribe, Skokomish Indian Tribe, Squaxin Island Tribe, Stillaguamish Tribe, Upper Skagit Tribe, Tulalip Tribe, Lummi Indian Nation, Quinault Indian Nation, Suquamish Indian Tribe, Puyallup Tribe, Hoh Tribe, Yakama Indian Nation, Quileute Indian Tribe, Makah Nation, Swinomish Indian Tribe, and the Muckleshoot Indian Tribe) (NS) Modified on 03/16/2001 (bz). (Entered: 03/16/2001)
06-01-2001	PLAINTIFF TRIBES' ANSWER TO WASHINGTON STATE'S COUNTER REQUEST FOR DETERMINATION [9-2] in 2:01-sp-00001 (filed by Swinomish Indian Tribal Community, Jamestown, Lower Elwha & Port Gamble S'Klallam Tribes, Nisqually, Nooksack, Sauk-Suiattle, Skokomish, Squaxin Island, Stillaguamish, Suquamish, Upper Skagit, Lummi Indian Nation, Makah Tribe, Hoh Tribe, Tulalip Tribes, Quinault Indian Nation, Puyallup Tribe, Muckleshoot tribe, Quileute Tribe, Yakama Indian Nation);

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06-18-2001 MOTION by Interested Party USA in 2:01-sp-00001 to strike affirmative defenses or for jdgmnt on pleadings NOTED FOR 7/13/01 in 2:01-sp-00001 (NS) (bz). (Entered: 06/18/2001)

06-18-2001 MEMORANDUM by Interested Party USA in 2:01-sp-00001 in support of motion to strike affirmative defenses or for jdgmnt on pleadings [36-1] in 2:01-sp-00001 (NS) (bz). (Entered: 06/18/2001)

06-27-2001 MOTION by defendant Washington State of in 2:01-sp-00001 for order granting judgment on the pleadings re: law of the case NOTED FOR 7/20/01 in 2:01-sp-00001, (NS) (bz). (Entered: 06/27/2001)

06-27-2001 BRIEF IN SUPPORT by defendant Washington State of in 2:01-sp-00001 in support of motion for order granting judgment on the pleadings re: law of the case [43-1] in 2:01-sp-00001 (NS) (bz). (Entered: 06/27/2001)

07-12-2001 ORDER REGARDING STATUS CONFERENCE by Judge Barbara J. Rothstein. On July 10, 2001, the court held a status conf. with all parties present. After hearing from the parties, the court considered the following matters and reached the following conclusions: The USA shall be considered a plaintiff in this subproceeding for all purposes; The court

	has approved and signed the scheduling order agreed to by all parties; The court concluded it will not require that the "Phase II" designation be included as part of the caption of this subproceeding (please see order for details). (cc: 9213 counsel, BJR) (NS) (Entered: 07/12/2001)
07-14-2001	STATE'S OPPOSITION by defendant Washington State of in 2:01-sp-00001 to motion to strike affirmative defenses or for jdgmnt on pleadings [36-1] in 2:01-sp-00001 (NS) (bz). (Entered: 07/17/2001)
07-19-2001	REPLY MEMORANDUM by plaintiff USA in 2:01-sp-00001 IN SUPPORT OF US's motion to strike affirmative defenses or for jdgmnt on pleadings [36-1] in 2:01-sp-00001; service attached -- svc. by mail on 7/18/01 (NS) (bz). (Entered: 07/19/2001)
07-20-2001	ORDER DENYING MOTION TO DISMISS by Judge Barbara J. Rothstein DENYING USA's motion to dismiss State's Cross-RFD [19-1] in 2:01-sp-00001 (cc: 9213 counsel, BJR) (NS) (Entered: 07/23/2001)
07-26-2001	UNITED STATES' OPPOSITION by plaintiff USA in 2:01-sp-00001 to Washington State's motion for order granting judgment on the pleadings re: law of the case [43-1] in 2:01-sp-00001; service attached -- svc. by mail on 7/25/01. (NS) (bz). (Entered: 07/30/2001)

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08-02-2001 ANSWER by plaintiff USA in 2:01-sp-00001 to WASHINGTON STATE'S CROSS REQUEST FOR DETERMINATION [9-1] in 2:01-sp-00001 (NS) (bz). (Entered: 08/03/2001)

08-09-2001 REPLY by defendant Washington State of in 2:01-sp-00001 IN SUPPORT of its motion for order granting judgment on the pleadings re: law of the case [43-1] in 2:01-sp-00001; service attached -- svc. by mail on 8/8/01 (NS) (bz). (Entered: 08/09/2001)

09-06-2001 ORDER GRANTING UNITED STATES' AND DENYING WASHINGTON'S MOTIONS FOR JUDGMENT by Judge Barbara J. Rothstein. The court concludes that WA's motion for judgment on the pleadings is without merit, and that motion is DENIED [43-1] in 2:01-sp-00001. For the reasons set forth in the order, the Court GRANTS the USA's motion to strike affirmative defenses or for jdgmnt on pleadings [36-1] in 2:01-sp-00001. The court finds that 15 of WA's affirmative defenses are insufficient as a matter of law. Those affirmative defenses are hereby STRICKEN from

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10-26-2001 ORDER GRANTING UNITED STATES' MOTION FOR RECONSIDERATION AND MOTION TO DISMISS STATE'S CROSS-REQUEST FOR DETERMINATION by Judge Barbara J. Rothstein GRANTING motion for reconsideration of court's order denying motion to dismiss [69-1] in 2:01-sp-00001 (cc: 9213 counsel, BJR) (NS) (Entered: 10/26/2001)

03-27-2002 STIPULATION and ORDER DIRECTING NEGOTIATION OF THE COORDINATED PLAN TO REPAIR CULVERTS, AND AMENDING SCHEDULING ORDER by Judge Barbara J. Rothstein: It is hereby ordered that the US, Tribes, and State of WA shall enter into negotiations to address the issues set out in paragraph 2 of the incorporated Stipulation and they shall submit the agreements reached within 6 months from the date of this Order or advise the Court that negotiations have reached an impasse. The State of WA's Motion for Leave to Set Up Counterclaim By Amendment is hereby stricken with leave to renote. The Pretrial Schedule of 7/10/01 shall be amended as follows: discovery ddl continued to 11/22/02 in 2:01-sp-00001; trial set for 12/2/03 (or as set in Pretrial Conference) in 2:01-sp-00001; Disclose Rebuttal Expert Witnesses by 4/4/03 in

2:01-sp-00001; Dispositive Motions to be filed by 3/28/03 in 2:01-sp-00001; The week of May 27/June 2, 2003, Pretrial Conf. to set trial deadlines and finalize the trial date. October/November 2003 Final Pretrial Conf (as set by the Court) The parties shall provide a progress report to the Court in 90 days. See order for specifics on all deadlines (cc: 9213 counsel, BJR) (NS) (Entered: 03/27/2002)

11-22-2004 REPLY, filed by Defendant WA State of, TO RESPONSE to 17784 MOTION for Leave to File *Leave to Set Up Counterclaim by Amendment and Argument in Support* (Attachments: # 1 # 2 # 3 Exhibit Exhibit A with Cover and Report # 4 Exhibit Ex A with App 1 and 2 # 5 Exhibit Ex A with App 3, 4, and 5 # 6 Exhibit Exhibit B # 7 Exhibit Exhibit C) (Woods, Fronda) (Entered: 11/22/2004)

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08-14-2006 MOTION for Summary Judgment [and to Allow Equitable Defenses Against the United States] *and Argument in Support* by Defendant WA State of. Noting Date 9/29/2007. (Attachments: # 1 # 2 Proposed Order # 3) (Woods, Fronda) (Entered: 08/14/2006)

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Indian Tribe, Quinault Indian Nation, Sauk-Suiattle Tribe, Skokomish Indian Tribe, Squaxin Island, Stillaguamish Tribe, Suquamish Indian Tribe, Swinomish Tribal Community, Tulalip Tribe, Upper Skagit Tribe, Confederated Tribes and Bands of the Yakama Indian Nation, TO RESPONSE to 18552 MOTION for Summary Judgment *and Argument in Support* (Attachments: #1 Declaration of John Sledd #2 Certificate of Service) (Sledd, John) (Entered: 10/11/2006)

01-29-2007 STIPULATION OF PLAINTIFFS AND STATE OF WASHINGTON REGARDING SCOPE OF SUBPROCEEDING, AND ORDER. See orders for specifics. by Judge Ricardo S Martinez. (NS,) (Entered: 01/29/2007)

08-22-2007 ORDER ON CROSS-MOTIONS FOR SUMMARY JUDGMENT. DENYING (287) the State of WA's Motion for Summary Judgment; GRANTING (295) the Tribes' Motion for Summary Judgment in case 2:01-sp-00001-RSM; DENYING (18552) the State of WA's Motion for Summary Judgment; GRANTING (18560) the Tribes' Motion for Summary Judgment in case 2:70-cv-09213-RSM in case 2:01-sp-00001-RSM Status Conference set for 8/29/2007 at 01:30 PM before Hon. Ricardo S Martinez. by Judge Ricardo S Martinez. (NS,) (Entered: 08/22/2007)

08-23-2007	AMENDED/CORRECTED ORDER ON CROSS-MOTIONS FOR SUMMARY JUDGMENT 18560 18552 287 295 The amended order corrects the inadvertent omission of the Muckleshoot Indian Tribe from the list of Tribes filing or joining in the Request for Determination by Judge Ricardo S Martinez. (NS,) (Entered: 08/23/2007)
08-27-2007	WITHDRAWAL of Motion re (387 in 2:01-sp-00001-RSM, 18874 in 2:70-cv-09213-RSM) MOTIONS IN LIMINE ; by Defendant WA State of. (Woods, Fronda) (Entered: 08/27/2007)
08-27-2007	WITHDRAWAL of Motion re (18873 in 2:70-cv-09213-RSM, 386 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE *re: Moderate Living*; by Plaintiffs Stillaguamish Tribe, Upper Skagit Tribe, Tulalip Tribe, Lummi Indian Nation, Quinault Indian Nation, Puyallup Tribe, Hoh Tribe, Confederated Tribes and Bands of the Yakama Indian Nation, Quileute Indian Tribe, Suquamish Indian Tribe, Makah Nation, Swinomish Tribal Community, Muckleshoot Indian Tribe, Jamestown S'Klallam Tribe, Lower Elwha Band of Klallams, Port Gamble Band Clallam, Nisqually Indian Tribe, Nooksack Tribe, Sauk-Suiattle Tribe, Skokomish Indian Tribe, Squaxin Island Tribe. (Sledd, John) (Entered: 08/27/2007)

09-14-2009 MOTIONS IN LIMINE *RE Martin Fox Study* by Defendant WA State of. (Attachments: #1 Proposed Order, #2 Declaration of Fronda Woods In Support of Motion, #3 Certificate of Service) Noting Date 10/2/2009, (Woods, Fronda) (Entered: 09/14/2009)

09-14-2009 MOTIONS IN LIMINE *RE Fish Production From State Culverts* by Defendant WA State of. (Attachments: #1 Proposed Order, #2 Declaration of Fronda Woods with Documents in Support, #3 Certificate of Service) Noting Date 10/2/2009, (Woods, Fronda) (Entered: 09/14/2009)

09-17-2009 Joint MOTIONS IN LIMINE *to Exclude Expert Smelser* by Plaintiff Lummi Indian Nation. (Attachments: #1 Proposed Order) Noting Date 10/2/2009, (Johnsen, Harry) (Entered: 09/17/2009)

09-17-2009 DECLARATION of Harry L. Johnsen filed by Plaintiff Lummi Indian Nation re (574 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Attachments: #1 Pages 6-33 of Declaration, #2 Pages 34-68 of Declaration, #3 Pages 69-82 of Declaration, #4 Pages 83-107 of Declaration) (Johnsen, Harry) (Entered: 09/17/2009)

09-24-2009 Exhibit List *Stipulation re: Treaty and Non-Treaty Harvest Data* by Intervenor Plaintiff Puyallup Tribe of Indians. (Stiltner, Samuel) (Entered: 09/24/2009)

09-28-2009 RESPONSE, by Plaintiff Muckleshoot Indian Tribe, to (572 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE. (Attachments: # 1 Declaration of Alan Stay pp 1-47, # 2 Declaration of Alan Stay pp 48-86, # 3 Declaration of Martin Fox) (Otsea, Robert) (Entered: 09/28/2009)

09-28-2009 RESPONSE, by Plaintiff Lummi Indian Nation, to (573 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE. (Johnsen, Harry) (Entered: 09/28/2009)

09-28-2009 DECLARATION of Lauren Rasmussen filed by Plaintiff Lummi Indian Nation re (573 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Johnsen, Harry) (Entered: 09/28/2009)

09-28-2009 DECLARATION of Andris Rankis filed by Plaintiff Lummi Indian Nation re (573 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Johnsen, Harry) (Entered: 09/28/2009)

09-28-2009 RESPONSE, by Defendant WA State of, to (574 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE. (Shaftel, Douglas) (Entered: 09/28/2009)

09-28-2009 DECLARATION of Kit Rawson filed by Plaintiff Lummi Indian Nation re (573 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Johnsen, Harry) (Entered: 09/28/2009)

09-28-2009 DECLARATION of David Smelser filed by Defendant WA State of re (574 in 2:01-sp-00001-RSM) MOTIONS IN

LIMINE (Shaftel, Douglas) (Entered: 09/28/2009)

09-28-2009 DECLARATION of Michael Barber filed by Defendant WA State of re (574 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Shaftel, Douglas) (Entered: 09/28/2009)

09-28-2009 DECLARATION of Eric Warner filed by Plaintiff Lummi Indian Nation re (573 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Johnsen, Harry) (Entered: 09/28/2009)

09-28-2009 DECLARATION of William Beattie filed by Plaintiff Lummi Indian Nation re (573 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Johnsen, Harry) (Entered: 09/28/2009)

09-28-2009 DECLARATION of Douglas D. Shaftel filed by Defendant WA State of re (574 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Shaftel, Douglas) (Entered: 09/28/2009)

09-28-2009 DECLARATION of Robert Hayman filed by Plaintiff Lummi Indian Nation re (573 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Attachments: #1 Exhibit, #2 Exhibit, #3 Exhibit, #4 Exhibit, #5 Exhibit, #6 Exhibit)(Johnsen, Harry) Modified on 9/29/2009 (NS).(NOTE: document filed with duplicated pages; refiled correctly as docket #593) (Entered: 09/28/2009)

09-28-2009 DECLARATION of Eric Beamer filed by Plaintiff Lummi Indian Nation re (573 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Attachments: #1 Exhibit) (Johnsen, Harry) (Entered: 09/28/2009)

09-29-2009 DECLARATION of Robert Hayman filed by Plaintiff Lummi Indian Nation re (573 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Attachments: #1 Attachment 1, #2 Attachment 2, #3 Attachment 3, #4 Attachment 4, #5 Attachment 5) (Johnsen, Harry) (Entered: 09/29/2009)

10-02-2009 REPLY, filed by Defendant WA State of, TO RESPONSE to (572 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Attachments: # 1 Ferester Dec re Fox MIL Reply) (Woods, Fronda) (Entered: 10/02/2009)

10-02-2009 REPLY, filed by Defendant WA State of, TO RESPONSE to (573 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Attachments: #1 Woods Declaration re Daubert Reply, #2 Certificate of Service Certificate of Service re Daubert Reply) (Woods, Fronda) (Entered: 10/02/2009)

10-02-2009 REPLY, filed by Plaintiff Lummi Indian Nation, TO RESPONSE to (574 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE (Attachments: #1 Second Declaration of Harry Johnsen) (Johnsen, Harry) (Entered: 10/02/2009)

10-08-2009 ORDER ON MOTIONS IN LIMINE, This matter is before the Court for

consideration of the parties three motions in limine. In case SP01-1RSM: DENYING (572) Motion in Limine; GRANTING (573) Motion in Limine; GRANTING (574) Motion in Limine; CV70-9213: denying (19358) Motion in Limine; granting (19359) Motion in Limine; granting (19360) Motion in Limine - SEE ORDER FOR FURTHER DESCRIPTION. by Judge Ricardo S Martinez.(SA) (Entered: 10/08/2009)

10-13-2009 TRIAL BRIEF by Defendant WA State of. (Shaftel, Douglas) (Entered: 10/13/2009)

10-13-2009 TRIAL BRIEF *PLAINTIFF TRIBES' TRIAL BRIEF* by Plaintiffs Stillaguamish Tribe, Upper Skagit Tribe, Tulalip Tribe, Lummi Indian Nation, Puyallup Tribe, Hoh Tribe, Confederated Tribes and Bands of the Yakama Indian Nation, Quileute Indian Tribe, Suquamish Indian Tribe, Makah Nation, Swinomish Tribal Community, Muckleshoot Indian Tribe, Jamestown S'Klallam Tribe, Lower Elwha Band of Klallams, Port Gamble Band Clallam, Nisqually Indian Tribe, Nooksack Tribe, Sauk-Suiattle Tribe, Skokomish Indian Tribe, Squaxin Island Tribe, Quinault Indian Nation. (Sledd, John) (Entered: 10/13/2009)

10-13-2009 MINUTE ENTRY for proceedings held before Judge Ricardo S Martinez- Dep Clerk: *Laurie Cuaresma*; Pla Counsel:

John Sledd, Alan Stay, Alix Foster, Tim Weaver, Mason Morisset, Lauren Rasmussen, John Hollowed, Peter Monson, Yale Lewis, Katherine Krueger, Laura Sagolla, Brian Gruber, Harold Chesnin, Sam Stiltner, Eric Nielsen, Tom Zielman, Bruce Davies; Def Counsel: *Rene Tomisser, Fronda Woods, Doug Shaftel, Phil Ferester*; CR: *Barry Fanning*; Time of Hearing: *9:00 AM*; Session #: *DAY 1*;BENCH TRIAL held on 10/13/2009. Counsel make opening statements. Plaintiff calls: CHARLENE KRISE, LORRAINE LOOMIS, LAWRENCE JAY WASSERMAN, MICHAEL McHENRY. Exhibits admitted. Bench trial will resume on 10/14/09 at 9:00 AM. (LC) (Entered: 10/13/2009)

10-14-2009 PRETRIAL ORDER, Subproceeding 01-1, In Re: Culverts by Judge Ricardo S Martinez. (NS) (Entered: 10/14/2009)

10-14-2009 MINUTE ENTRY for proceedings held before Judge Ricardo S. Martinez- Dep Clerk: *Lowell Williams*; Pla Counsel: *John Sledd, Alan Stay, Alix Foster, Tim Weaver, Mason Morisset, Lauren Rasmussen, John Hollowed, Peter Monson, Yale Lewis, Katherine Krueger, Laura Sagolla, Brian Gruber, Harold Chesnin, Sam Stiltner, Eric Nielsen, Tom Zielman, Bruce Davies*; Def Counsel: *Rene Tomisser, Fronda Woods, Doug Shaftel, Phil Ferester*; CR: *Barry*

Fanning; Time of Hearing: *9:00 AM*; Courtroom: *13206*; Bench Trial held on 10/14/2009. MICHAEL McHENRY resumes stand on cross-exam. MARTIN FOX, KIT RAWSON and KAREN WALTER sworn and testify. Exhibits admitted. (LW) (Entered: 10/14/2009

10-15-2009 MINUTE ENTRY for proceedings held before Judge Ricardo S. Martinez- Dep Clerk: *Lowell Williams*; Pla Counsel: *John Sledd, Alan Stay, Alix Foster, Tim Weaver, Mason Morisset, Lauren Rasmussen, John Hollowed, Peter Monson, Yale Lewis, Katherine Krueger, Laura Sagolla, Brian Gruber, Harold Chesnin, Sam Stiltner, Eric Nielsen, Tom Zielman, Bruce Davies*; Def Counsel: *Rene Tomisser, Fronda Woods, Doug Shaftel, Phil Ferester*; CR: *Barry Fanning*; Time of Hearing: *9:00 Am*; Courtroom: *13206*;Bench Trial held on 10/15/2009. Defendants respond to plaintiffs' offer of proof and call PAUL SEKULICH. TYSON WALDO, PHILIP MEYER, RANDOLPH KINLEY and EDWARD JOHNSTONE sworn and testify. Plaintiffs rest. Defendants call PAUL SEKULICH. Exhibits admitted. Bench trial to resume October 19, 2009 at 9:00 AM. (LW) (Entered: 10/15/2009)

10-16-2009 MEMORANDUM filed by Plaintiff Tulalip Tribe re (573 in 2:01-sp-00001-RSM) MOTIONS IN LIMINE Treaty Tribes' Bench Memo Re Revised &

Redacted Written Direct Testimony (Morisset, Mason) (Entered: 10/16/2009)

10-19-2009 MINUTE ENTRY for proceedings held before Judge Ricardo S Martinez- Dep Clerk: *Laurie Cuaresma*; Pla Counsel: *John Sledd, Alan Stay, Alix Foster, Tim Weaver, Mason Morisset, Lauren Rasmussen, John Hollowed, Peter Monson, Yale Lewis, Katherine Krueger, Laura Sagolla, Brian Gruber, Harold Chesnin, Sam Stiltner, Eric Nielsen, Tom Zeilman, Bruce Davies*; Def Counsel: *Doug Shaftel, Rene Tomisser, Fronda Woods, Phil Ferester*; CR: *Barry Fanning*; Time of Hearing: *9:00 AM*; Bench Trial held on 10/19/2009. Defense witnesses called: PAUL WAGNER, MICHAEL BARBER sworn and testify. Exhibits entered. Bench trial will resume on 10/20/09 at 9:00 A.M. (LC) (Entered: 10/19/2009)

10-20-2009 MINUTE ENTRY for proceedings held before Judge Ricardo S Martinez- Dep Clerk: *Laurie Cuaresma*; Pla Counsel: *John Sledd, Alan Stay, Alix Foster, Mason Morisset, Lauren Rasmussen, John Hollowed, Peter Monson, Yale Lewis, Katherine Krueger, Laura Sagolla, Brian Gruber, Harold Chesnin, Sam Stiltner, Eric Nielsen, Tom Zeilman*; Def Counsel: *Fronda Woods, Phil Ferester, Renee Tomisser, Doug Shaftel*; CR: *Barry Fanning*; Time of Hearing: *9:00 AM*; Courtroom: *13206*;

	Bench Trial - DAY 5 held on 10/20/2009. Def witnesses called: MICHAEL BARBER, ALEX NAGYGYOR, ROBERT BARNARD, ALLISON HANSON sworn and testify. Exhibits admitted. Bench trial will continue on Friday 10/23/09 at 9:00 AM. Court is in recess. (LC) (Entered: 10/20/2009)
10-23-2009	MINUTE ENTRY for proceedings held before Judge Ricardo S. Martinez- Dep Clerk: *Lowell Williams*; Pla Counsel: *John Sledd, Alan Stay, Alix Foster, Mason Morisset, Lauren Rasmussen, John Hollowed, Peter Monson, Yale Lewis, Katherine Krueger, Laura Sagolla, Brian Gruber, Harold Chesnin, Sam Stiltner, Eric Nielsen, Tom Zeilman*; Def Counsel: *Fronda Woods, Phil Ferester, Renee Tomisser, Doug Shaftel*; CR: *Barry Fanning*; Time of Hearing: *9:00 AM*; Courtroom: *13206*; Bench Trial - Day 6 held on 10/23/2009. ALLISON HANSON resumes stand on cross-examination. JEFFREY KOENINGS and BRIAN BENSON sworn and testify. Exhibits admitted. Bench trial will resume October 26, 2009 at 9:00 AM. (LW) (Entered: 10/23/2009)
10-26-2009	MINUTE ENTRY for proceedings held before Judge Ricardo S Martinez- Dep Clerk: *Laurie Cuaresma*; Pla Counsel: *John Sledd, Alan Stay, Alix Foster, Mason Morisset, Lauren Rasmussen, John Hollowed, Peter Monson, Yale*

	Lewis, Katherine Krueger, Laura Sagolla, Brian Gruber, Harold Chesnin, Sam Stiltner, Eric Nielsen, Tom Zeilman; Def Counsel: *Rene Tomisser, Fronda Woods, Doug Shaftel, Phil Ferester*; CR: *Nancy Bauer*; Time of Hearing: ***9:00 AM***; Courtroom: ***13206***; BENCH TRIAL - DAY 7 held on 10/26/2009. Def calls: VICTOR MOORE, JEFF CARPENTER. Exhibits entered. Def rests. Pla calls rebuttal witness: DR. PHILIP RONI. Testimony is concluded. Submissions regarding evidentiary disputes to be filed by 11/9/09; proposed Findings of Fact and Conclusions of Law to be filed by the parties by 12/11/09. Closing arguments to be set at a later date. (LC) (Entered: 10/26/2009)
10-26-2009	PLAINTIFF TRIBES' BENCH MEMORANDUM RE: ADMISSIBILITY OF CERTAIN EXHIBITS PROPOSED BY TRIBES by Plaintiff Swinomish Tribal Community. (Attachments: #1 Exhibit Trial Bench Memorandum Appendix 1-3, #2 Exhibits Trial Bench Memorandum Appendix 4 & 5) (SA) (Entered: 10/27/2009)
11-24-2009	ORDER ON MOTION TO ADMIT EXHIBITS This matter is before the Court for consideration of plaintiff Tribes' motion to admit certain exhibits made during the bench trial in this matter (9213 dkt #19423; 01-1 dkt #624), and the Court directed the parties to

	complete briefing on the issue post-trial. This Court's ruling on the admissibility of the exhibits will guide the parties in preparing their Findings of Fact and Conclusions of Law, as directed by the Court on 10/26/2009. The Tribes' motion to admit evidence is GRANTED, and the exhibits listed in the Tribes' memorandum (Dkt #624), with the exception of Exhibit AT-235 which has been withdrawn (Dkt #626), shall be admitted. The parties shall confer and arrange a time for a representative to meet the Courtroom Deputy to review exhibits and conform them to the Court's rulings on admissibility. by Judge Ricardo S Martinez. (NS) (Entered: 11/24/2009)
12-16-2009	STIPULATED MOTION AND ORDER GRANTING MOTION (dkt#641 in case 2:01-sp-00001-RSM; dkt #19462 in case 2:70-cv-09213-RSM) IT IS HEREBY ORDERED THAT Exhibits AT-004-4 and AT-004-5 be withdrawn from evidence in this case. by Judge Ricardo S Martinez. (NS) (Entered: 12/16/2009)
01-29-2010	Proposed Findings of Fact by Defendant WA State of (Woods, Fronda) (Entered: 01/29/2010)
01-29-2010	MOTION for Findings of Fact & Conclusions of Law by Plaintiffs Stillaguamish Tribe, Upper Skagit Tribe, Tulalip Tribe, Lummi Indian Nation, Quinault Indian Nation,

Puyallup Tribe, Hoh Tribe, Confederated Tribes and Bands of the Yakama Indian Nation, Quileute Indian Tribe, Suquamish Indian Tribe, Makah Nation, Swinomish Tribal Community, United States of America, Muckleshoot Indian Tribe, Jamestown S'Klallam Tribe, Lower Elwha Band of Klallams, Port Gamble Band Clallam, Nisqually Indian Tribe, Nooksack Tribe, Sauk-Suiattle Tribe, Skokomish Indian Tribe, Squaxin Island Tribe. (01-sp-01RSM) (Attachments: #1 Plaintiffs' Proposed Conclusions of Law) Noting Date 1/29/2010, (Sledd, John) Modified on 3/14/2012 (CL). (Entered: 01/29/2010)

01-29-2010 MOTION for Permanent Injunction by Plaintiffs Stillaguamish Tribe, Upper Skagit Tribe, Tulalip Tribe, Lummi Indian Nation, Quinault Indian Nation, Puyallup Tribe, Hoh Tribe, Confederated Tribes and Bands of the Yakama Indian Nation, Quileute Indian Tribe, Suquamish Indian Tribe, Makah Nation, Swinomish Tribal Community, United States of America, Muckleshoot Indian Tribe, Jamestown S'Klallam Tribe, Lower Elwha Band of Klallams, Port Gamble Band Clallam, Nisqually Indian Tribe, Nooksack Tribe, Sauk-Suiattle Tribe, Skokomish Indian Tribe, Squaxin Island Tribe. (01-sp-01RSM) Noting Date 1/29/2010, (Sledd, John) Modified on 3/14/2012 (CL). (Entered: 01/29/2010)

02-02-2010	MINUTE ORDER The State's Motion to ADMIT EXHIBIT W-089 in case 2:01-sp-00001-RSM (dkt #642); case 2:70-cv-09213-RSM (dkt #19465), is GRANTED. The Court will consider the Tribe's objections in determining what weight to accord Mr. Barnard's opinions. by Judge Ricardo S Martinez. (NS) (Entered: 02/02/2010)
02-05-2010	NOTICE *United States' Joinder in Plaintiff's Post-Trial Brief* ; filed by Plaintiff United States of America. (Monson, Peter) (Entered: 02/05/2010)
02-05-2010	TRIAL BRIEF *(Post Trial)* by Defendant WA State of. (Tomisser, Rene) (Entered: 02/05/2010)
02-12-2010	TRIAL BRIEF *Tribal Post-Trial Brief (Corrected)* by Intervenor Plaintiff Puyallup Tribe of Indians. (Stiltner, Samuel) (Entered: 02/12/2010)
06-07-2010	MINUTE ENTRY for proceedings held before Judge Ricardo S Martinez- Dep Clerk: *Laurie Cuaresma*; Pla Counsel: *John Sledd, Alan Stay, Alix Foster, Mason Morisset, Lauren Rasmussen, John Hollowed, Peter Monson, Yale Lewis, Katherine Krueger, Brian Gruber, Sam Stiltner, Tom Zeilman, Dan Raas, Kevin Lyon, Mary Neil, Michelle Hansen, Richard Reich, Howard Arnett*; Def Counsel: *Rene Tomisser, Fronda Woods, Doug Shaftel, Phil Ferester*; CR: *Barry Fanning*; Time of Hearing: *1:30 PM*; In Court Hearing held on 6/7/2010. Court

	hears CLOSING ARGUMENT of counsel and takes matter under advisement. (LC) (Entered: 06/07/2010)
01-11-2013	ORDER ON SUPPLEMENTAL BRIEFING by Judge Ricardo S Martinez. The parties are directed to file supplemental memoranda, together with relevant exhibits, presenting any new and relevant facts which should be brought to the Court's attention. The memoranda, limited to twenty pages each, shall be filed on or before February 1, 2013. Any accompanying declarations and attached exhibits shall be limited to forty pages in total. No rebuttal materials may be filed. (CL) (cc: Clam Acres) (Entered: 01/11/2013)
02-01-2013	MEMORANDUM *United States' Supplemental Post-Trial Memorandum* by Plaintiff United States of America. (Monson, Peter) (Entered: 02/01/2013)
02-01-2013	DECLARATION *of Yvonne M. Marsh to US' Supplemental Post-Trial Memorandum* by Plaintiff United States of America. (Attachments: #1 Exhibit 1, #2 Exhibit 2, #3 Exhibit 3, #4 Exhibit 4, #5 Exhibit 5, #6 Exhibit 6)(Monson, Peter) (Entered: 02/01/2013)
02-01-2013	DECLARATION *of Steven Landino to US' Supplemental Post-Trial Memorandum* by Plaintiff United States of America. (Monson, Peter) (Entered: 02/01/2013)

02-01-2013	*State of Washington's Supplemental* BRIEF by Defendant WA State of. (Tomisser, Rene) (Entered: 02/01/2013)
02-01-2013	DECLARATION of Rene Tomisser re 738 Brief by Defendant WA State of. (Tomisser, Rene) (Entered: 02/01/2013)
02-01-2013	DECLARATION of Alex Nagygyor re 738 Brief by Defendant WA State of. (Tomisser, Rene) (Entered: 02/01/2013)
02-01-2013	DECLARATION of Candace Espeseth re 738 Brief by Defendant WA State of. (Tomisser, Rene) (Entered: 02/01/2013)
02-01-2013	DECLARATION of Deborah Petersen re 738 Brief by Defendant WA State of. (Tomisser, Rene) (Entered: 02/01/2013)
02-01-2013	DECLARATION of Robert Barnard re 738 Brief by Defendant WA State of. (Tomisser, Rene) (Entered: 02/01/2013)
02-01-2013	DECLARATION of Julie Henning re 738 Brief by Defendant WA State of. (Tomisser, Rene) (Entered: 02/01/2013)
02-01-2013	DECLARATION of Jay Alexander re 738 Brief by Defendant WA State of. (Tomisser, Rene) (Entered: 02/01/2013)
02-01-2013	DECLARATION of Paul Wagner re 738 Brief by Defendant WA State of. (Tomisser, Rene) (Entered: 02/01/2013)
02-01-2013	*Tribal Supplemental* BRIEF *Regarding Post-Trial Events and the Need for Injunctive Relief* by Plaintiffs Confederated Tribes and Bands of the Yakama Indian Nation, Hoh Tribe, Jamestown S'Klallam Tribe, Lower

Elwha Band of Klallams, Lummi Indian Nation, Makah Nation, Muckleshoot Indian Tribe, Nisqually Indian Tribe, Nooksack Tribe, Port Gamble Band Clallam, Puyallup Tribe, Quinault Indian Nation, Sauk-Suiattle Tribe, Skokomish Indian Tribe, Squaxin Island Tribe, Stillaguamish Tribe, Suquamish Indian Tribe, Swinomish Tribal Community, Tulalip Tribe. (Sledd, John) (Entered: 02/01/2013)

02-01-2013 DECLARATION of Alix Foster by Plaintiffs Confederated Tribes and Bands of the Yakama Indian Nation, Hoh Tribe, Jamestown S'Klallam Tribe, Lower Elwha Band of Klallams, Lummi Indian Nation, Makah Nation, Muckleshoot Indian Tribe, Nisqually Indian Tribe, Nooksack Tribe, Port Gamble Band Clallam, Puyallup Tribe, Quinault Indian Nation, Sauk-Suiattle Tribe, Skokomish Indian Tribe, Squaxin Island Tribe, Stillaguamish Tribe, Suquamish Indian Tribe, Swinomish Tribal Community, Tulalip Tribe. (Sledd, John) (Entered: 02/01/2013)

02-01-2013 DECLARATION of Keith Lutz by Plaintiffs Confederated Tribes and Bands of the Yakama Indian Nation, Hoh Tribe, Jamestown S'Klallam Tribe, Lower Elwha Band of Klallams, Lummi Indian Nation, Makah Nation, Muckleshoot Indian Tribe, Nisqually Indian Tribe, Nooksack Tribe, Port

Gamble Band Clallam, Puyallup Tribe, Quinault Indian Nation, Sauk-Suiattle Tribe, Skokomish Indian Tribe, Squaxin Island Tribe, Stillaguamish Tribe, Suquamish Indian Tribe, Swinomish Tribal Community, Tulalip Tribe. (Sledd, John) (Entered: 02/01/2013)

02-06-2013 PRAECIPE re 748 Brief, *Plaintiff Tribes' Post-Trial Supplemental Brief* by Plaintiffs Confederated Tribes and Bands of the Yakama Indian Nation, Hoh Tribe, Jamestown S'Klallam Tribe, Lower Elwha Band of Klallams, Lummi Indian Nation, Makah Nation, Muckleshoot Indian Tribe, Nisqually Indian Tribe, Nooksack Tribe, Port Gamble Band Clallam, Puyallup Tribe, Quinault Indian Nation, Sauk-Suiattle Tribe, Skokomish Indian Tribe, Squaxin Island Tribe, Stillaguamish Tribe, Suquamish Indian Tribe, Swinomish Tribal Community, Tulalip Tribe. (Sledd, John) (Entered: 02/06/2013)

03-29-2013 ORDER by Judge Ricardo S. Martinez. The Court GRANTS the Tribes' motion for a Permanent Injunction in 01-sp-01RSM docket no. 6[illegible], in 70-cv-9213RSM, docket no. 19508. (CL) (cc: Clam Acres) (Entered: 03/29/2013)

03-29-2013 PERMANENT INJUNCTION RE-GARDING CULVERT (01-sp-01RSM) CORRECTION by Judge Ricardo S Martinez. (CL) (cc: Clam Acres) (Entered: 03/29/2013)

04-01-2013	ORDER: SUPPLEMENT TO MEMORANDUM AND DECISION by Judge Ricardo S Martinez. The attached documents, Attachment A and B, were referred to in the Court's Memorandum and Decision filed March 29, 2012. Dckt. #752, (Attachments: #(1) Exhibit A, #(2) Exhibit B) (CL) (cc: Clam Acres) (Entered: 04/01/2013)
04-01-2013	NOTICE of Corrected Image/Document re (754 in 2:01-sp-00001-RSM, 20387 in 2:70-cv-09213-RSM) Order, (Service of corrected image is attached). (Attachments: #1 Exhibit A, #2 Exhibit B) (CL) (Entered: 04/01/2013)
05-28-2013	NOTICE OF APPEAL (13-35474) to Ninth Circuit by Defendant WA State of. (Purcell, Noah) Modified on 5/28/2013; Filing Fee Paid in main case; 70-CV-9213; Receipt No: 0981-3221568. (LMK). Modified on 5/29/2013, ADD CCA# (SA). (Entered: 05/28/2013)
09-27-2013	NOTICE of Filing Lists of Barrier Culverts ; filed by Defendant WA State of. (Attachments: # 1 Exhibit 1, # 2 Exhibit 2, # 3 Exhibit 3, # 4 Exhibit 4, # 5 Exhibit 5) (Shorin, Joseph) (Entered: 09/27/2013)

RELEVANT DOCKET ENTRIES

U.S. Ninth Circuit Court of Appeals
Docket No. 13-35474

10-07-2013 Submitted (ECF) First Brief on Cross-Appeal for review. Submitted by Appellant State of Washington in 13-35474, Appellee State of Washington in 13-35519. Date of service: 10/07/2013. [8812577] [13-35474, 13-35519]--[COURT UPDATE: Edited docket text to reflect correct brief type. Resent NDA. 10/10/2013 by RY] (Watson, Laura) [Entered: 10/07/2013 05:37 PM]

10-09-2013 Submitted (ECF) excerpts of record. Submitted by Appellant State of Washington in 13-35474, Appellee State of Washington in 13-35519. Date of service: 10/09/2013. [8816274] [13-35474, 13-35519] (Watson, Laura) [Entered: 10/09/2013 04:15 PM]

10-11-2013 Submitted (ECF) Amicus brief for review (by government or with consent per FRAP 29(a)). Submitted by Washington State Association of Counties. Date of service: 10/11/2013. [8819771] [13-35474, 13-35519] --[COURT UPDATE: Attached corrected brief. Resent NDA. 10/16/2013 by RY] (Loginsky, Pamela) [Entered: 10/11/2013 04:31 PM]

10-15-2013 Submitted (ECF) Amicus Brief for review. Submitted by Amicus Curiae - Pending State Of Oregon. Date of

service: 10/15/2013. [8821166] (Striffler, Stephanie) [Entered: 10/15/2013 11:57 AM]

01-21-2014 Submitted (ECF) Answering Brief for review. Submitted by Appellee USA in 13-35474, - USA in 13-35519. Date of service: 01/21/2014. [8945937] [13-35474, 13-35519] (Shilton, David) [Entered: 01/21/2014 03:25 PM]

01-21-2014 Submitted (ECF) Second Brief on Cross-Appeal and supplemental excerpts of record for review. Submitted by Appellees Confederated Tribes and Bands of the Yakama Indian Nation, Hoh Tribe, Jamestown S'Klallam Tribe, Lower Elwha Band of Klallams, Lummi Indian Nation, Makah Indian Tribe, Muckleshoot Indian Tribe, Nisqually Indian Tribe, Nooksack Indian Tribe, Port Gamble Band Clallam, Puyallup Tribe, Quileute Indian Tribe, Quinault Indian Nation, Sauk-Suiattle Tribe, Skokomish Indian Tribe, Squaxin Island Tribe, Stillaguamish Tribe, Suquamish Indian Tribe, Swinomish Indian Tribal Community, Tulalip Tribes and Upper Skagit Indian Tribe in 13-35474. Date of service: 01/21/2014. [8946403] [13-35474, 13-35519]--[COURT UP-DATE: Edited docket text to reflect correct brief type. Removed duplicate excerpts (SER part 4). Resent NDA. 01/22/2014 by RY] (Sledd, John) [Entered: 01/21/2014 10:59 PM]

01-28-2014 Submitted (ECF) Amicus brief for review (by government or with consent per FRAP 29(a)). Submitted by Indian Law Professors. Date of service: 01/28/2014. [8956762]--[COURT UPDATE: Attached corrected brief and certificate of service. Resent NDA. 01/29/2014 by RY] (Routel, Colette) [Entered: 01/28/2014 07:08 PM]

01-29-2014 Submitted (ECF) Amicus brief for review (by government or with consent per FRAP 29(a)). Submitted by Pacific Coast Federation of Fishermen's Associations and Institute for Fisheries Resources. Date of service: 01/29/2014. [8958138] (Brimmer, Janette) [Entered: 01/29/2014 03:33 PM]

03-24-2014 Submitted (ECF) Reply Brief and further excerpts of record for review. Submitted by Appellant State of Washington. Date of service: 03/24/2014. [9029239] (Watson, Laura) [Entered: 03/24/2014 04:24 PM]

09-01-2015 FILED (ORIGINAL) CERTIFIED RECORD ON APPEAL. Record Part: Clerks Record, No. of Volumes: 4, Sealed: n. [9667567] (SOS) [Entered: 09/01/2015 10:55 AM]

10-16-2015 ARGUED AND SUBMITTED TO WILLIAM A. FLETCHER, RONALD M. GOULD and DAVID A. EZRA. [9721123] (SB) [Entered: 10/16/2015 12:01 PM]

06-27-2016 FILED OPINION (WILLIAM A. FLETCHER, RONALD M. GOULD and DAVID A. EZRA) AFFIRMED. Judge: WAF Authoring. FILED AND ENTERED JUDGMENT. [10029546] -- [Edited: Attached corrected PDF of opinion (clerical correction/typo). 06/27/2016 by TYL] (MM) [Entered: 06/27/2016 08:26 AM]

08-11-2016 Filed (ECF) Appellant State of Washington petition for panel rehearing and petition for rehearing en banc (from 06/27/2016 opinion). Date of service: 08/11/2016. [10086655]-- [COURT ENTERED FILING to correct entry [117].] (SLM) [Entered: 08/15/2016 10:37 AM]

08-22-2016 Submitted (ECF) Amicus brief for review (by government or with consent per FRAP 29(a)). Submitted by States of Idaho and Montana. Date of service: 08/22/2016. [10094731] [13-35474] (Smith, Clay) [Entered: 08/22/2016 09:17 AM]

08-22-2016 Submitted (ECF) Amicus brief for review and filed Motion to become amicus curiae. Submitted by Klamath Critical Habitat Landowners Inc., Modoc Point Irrigation District; Mosby Family Trust; Sprague River Water Resource Foundation, Inc., and TPC, LLC. Date of service: 08/22/2016. [10096797] -- [COURT ENTERED FILING to correct

entry [122] .]--[Edited: attached corrected motion and brief. 08/23/2016 by SLM]--[Edited: attached corrected brief. 08/23/2016 by SLM] (TYL) [Entered: 08/23/2016 10:29 AM]

08-25-2016 Filed clerk order (Deputy Clerk: OC): Appellees are directed to file a response to Appellant's Petition for Rehearing and Rehearing En Banc filed with this court on August 11, 2016. The response shall not exceed fifteen pages or 4200 words, and shall be filed within 21 days of the date of this order. Parties who are registered for Appellate ECF must file the response electronically without submission of papers copies. Parties who are not registered Appellate ECF filers must file the original response plus 50 paper copies. [10100199] (OC) [Entered: 08/25/2016 09:22 AM]

09-29-2016 Filed (ECF) Appellee USA response to petition for panel rehearing and petition for rehearing en banc. Date of service: 09/29/2016. [10142617]. [13-35474]--[COURT UPDATE: Updated docket text to reflect content of filing. 09/29/2016 by SLM] (Ying, Evelyn) [Entered: 09/29/2016 02:28 PM]

09-29-2016 Filed (ECF) Appellees Confederated Tribes and Bands of the Yakama Indian Nation, Hoh Tribe, Jamestown S'Klallam Tribe, Lower Elwha Band of Klallams, Lummi Indian Nation, Makah

Indian Tribe, Muckleshoot Indian Tribe, Nisqually Indian Tribe, Nooksack Indian Tribe, Port Gamble Band Clallam, Puyallup Tribe, Quileute Indian Tribe, Quinault Indian Nation, Sauk-Suiattle Tribe, Squaxin Island Tribe, Stillaguamish Tribe, Suquamish Indian Tribe, Swinomish Indian Tribal Community, Tulalip Tribes and Upper Skagit Indian Tribe response to Combo PFR Panel and En Banc (ECF Filing), Combo PFR Panel and En Banc (ECF Filing) for panel and en banc rehearing, for panel and en banc rehearing (statistical entry). Date of service: 09/29/2016. [10143302]. [13-35474] (Sledd, John) [Entered: 09/29/2016 07:52 PM]

03-02-2017 Filed order and amended opinion (WILLIAM A. FLETCHER, RONALD M. GOULD and DAVID A. EZRA). Amending Disposition Opinion AFFIRMED; The opinion filed on June 27, 2016 is amended as follows: (SEE ORDER FOR FULL TEXT) No new Petition for Panel Rehearing or Petition for Rehearing en Banc will be entertained. Pending petitions remain pending and need not be renewed. [10339453] (RMM) [Entered: 03/02/2017 07:00 AM]

05-19-2017 Filed Order for PUBLICATION (WILLIAM A. FLETCHER, RONALD M. GOULD and DAVID A. EZRA)

(Concurrence by Judge W. Fletcher; Opinion Respecting Denial by Judge O'Scannlain; Statement by Judge Hurwitz) The panel, as constituted above, has voted unanimously to deny the petition for panel rehearing. Judges Fletcher and Gould have voted to deny the petition for rehearing en banc, and Judge Ezra so recommends. A judge of the court called for a vote on the petition for rehearing en banc. A vote was taken, and a majority of the non recused active judges of the court failed to vote for en banc rehearing. Fed. R. App. P. 35(f). The petition for rehearing and the petition for rehearing en banc, filed August 11, 2016, are DENIED. [10440900] (RMM) [Entered: 05/19/2017 06:57 AM]

05-30-2017 MANDATE ISSUED.(WAF, RMG and DAE) [10451721] (RL) [Entered: 05/30/2017 10:43 AM]

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Jan 16 2001
OFFICE OF ATTORNEY GENERAL
FISH & WILDLIFE DIVISION

HONORABLE JUDGE
BARBARA JACOBS ROTHSTEIN

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiff, v. STATE OF WASHINGTON, et al., Defendants.	Civil No. C70-9213 Sub-Proceeding No. 01-01 (Culverts) REQUEST FOR DETERMINATION

INTRODUCTION AND DESCRIPTION OF THE SUBPROCEEDING

The Tribes bring this subproceeding to enforce a duty upon the State of Washington to refrain from constructing and maintaining culverts under State roads that degrade fish habitat so that adult fish production is reduced, which in turn reduces the number of fish available for harvest by the Tribes. In part due to the reduction of harvestable fish caused by those actions of the State, the ability of the Tribes to achieve a moderate living from the Treaty fisheries has been impaired.

The Tribes seek mandatory relief requiring Washington to identify and then to open culverts under state roads and highway that obstruct fish passage, for fish runs returning to or passing through

the usual and accustomed grounds and stations of the plaintiff tribes.

I. PRELIMINARY MATTERS

1.1 Jurisdiction and venue are proper in this Court pursuant to the August 23, 1993 Order Modifying Paragraph 25 of Permanent Injunction.

1.2 A conference pursuant to modified Paragraph 25 was held on July 31, 2000, in accordance with a Request to Meet and Confer dated June 16, 2000, a copy of which is attached as Exhibit A. All parties were notified of this conference, and the defendants and a representative group of plaintiff-intervenors were present. No agreement was reached, although the parties agreed to exchange further positions.

1.3 On August 10, the State, pursuant to revised Paragraph 25(b)(2), demanded mediation.

1.4 In addition to demanding mediation, the State requested a 'government-to-government' meeting with tribal elected officials and Washington Governor Locke, Attorney General Gregoire, Transportation Director Morrison and other State officials. Tribal Chairs, Vice-chairs and other tribal officials from tribal plaintiff-intervenors attended. Governor Locke declared the parties at an impasse, and tribal officials agreed. Nonetheless the parties agreed to attend the mediation, and exchange further documents in preparation for the mediation.

1.5 The mediation took place in Seattle on October 26, 2000, from 9:00 a.m. until 3:00 p.m., with all parties represented. By agreement of the parties, former District of Oregon United States Attorney

Sidney Lezak served as the mediator. The parties were unable to reach an agreement and Mr. Lezak declared an impasse and concluded the mediation.

II. ESTABLISHED LAW AND FACTS

2.1 Each of the plaintiff Tribes has a fishing right reserved in treaties with the United States which "secured" the "right of taking fish, at all usual and accustomed grounds and stations, . . . in common with all citizens, . . ."

2.3 The Indians understood that the sharing of the fish with the citizens of the United States would not be a significant limitation on their right to take fish.

2.3 When the Treaties were signed, neither the United States nor the Indians contemplated that there would be any limitations on the number of fish that either the Indians or the non-Indians could harvest.

2.4 The tribes' harvest of fish declined for several decades before 1974 due to illegal State regulation, the unlawful exclusion of Indians from their traditional fishing areas, and discriminatory enforcement of State laws against Indian fishers. By 1974 the tribes were collectively harvesting only about 500,000 anadromous fish per year.

2.5 After the Court's decision in 1974, as the Court's decision was implemented, the tribes' harvest rose dramatically until 1986, when the collective tribal harvest, based upon safe and agreed upon escapement standards, exceeded 5,000,000 anadromous fish.

2.6 Since 1986, the number of anadromous fish available for harvest, and consequently tribal harvests, have decreased so greatly that by 1999 the tribal harvest was collectively about the same as their harvest at the time of the 1974 decision.

2.7 A significant reason for the decline of harvestable fish has been the destruction and modification of habitat needed for their survival.

III. OPERATIVE FACTS: FISH BLOCKING CULVERTS

3.1 Where a roadway crosses a river or stream, either a bridge must be constructed above the watercourse or a tunnel, called a culvert, must be built beneath the roadway. Where a culvert is correctly built and maintained, it does not impede the passage of fish through the culvert. However, where a culvert is improperly constructed or maintained, it may completely block all fish passage through the culvert, thereby preventing out-migration of juvenile fish to rearing areas or the salt water, or the return of adult fish to spawning beds, or both.

3.2 The blocking of fish passage at human made barriers such as road culverts is one of the most recurrent and correctable obstacles to healthy salmonid stocks in Washington.

3.3 One habitat-related cause for weakening of salmonid production which can be easily resolved is human-made barriers to fish migrations caused by improper placement, construction and maintenance of road culverts.

3. 4 The Washington State Department of Transportation (WSDOT) is the State agency

responsible for constructing and maintaining State Highways so that when the highways cross salmonid bearing streams the streams are not obstructed.

3.5 WSDOT, together with the Washington Department of Fisheries and Wildlife (WDFW), has inventoried all of the State Highway stream crossings in Washington State to determine which stream crossings block fish passage.

3.6 WSDOT and WDFW have published this inventory in these reports: (1) Fish Passage Program Progress Performance Report for the Biennium 1991-3; (2) Fish Passage Program Progress Performance Report for the Biennium 1993-5; and (3) Fish Passage Program Department of Transportation Final Report (hereinafter 'Final Report'), dated June, 1997.

3.7 According to the reports listed in Paragraph 3.6 culverts under State Highways owned and maintained by WSDOT block or obstruct adult salmonid access to at least 249 linear stream miles, at least 407,464 square meters of productive salmon spawning habitat, and at least 1,619,839 square meters of productive salmonid rearing habitat in the State of Washington.

3.8 If these blockages to fish passage were removed, WSDOT and WDFW estimate that approximately 200,000 adult salmonids would be produced annually by the areas opened to fish passage. Many of these fish would be available for harvest by the Tribes.

3.9 WSDOT and WDFW estimate that all of the fish blocking culverts identified in the Final

Report will be opened in 20 to 100 years or more, depending on Legislative appropriations.

3.10 Other State agencies or departments, including WDFW and the Washington Department of Natural Resources (DNR), administer state owned lands and have constructed and maintained culverts on those lands which block fish passage.

3.11 WDFW and DNR are each conducting an inventory of the culverts on lands which each department administers.

3.12 Reduction of productive fish habitat as a result of fish blocking culverts owned by the State reduces the number of fish available to plaintiff Tribes.

3.13 Such a reduction in the number of fish available to the plaintiff Tribes impairs the Tribes' ability to achieve a moderate living from their treaty fisheries.

3.14 Today, and since at least 1994, the Tribes are not able to achieve a moderate living from their treaty fisheries.

IV. DEMAND FOR JUDGMENT

WHEREFORE, the Plaintiff-Intervenor Tribes pray for judgment:

Declaratory Judgment:

4.1 The "right of taking fish," secured to the plaintiff tribes in the Stevens Treaties, imposes a duty upon the State Washington to refrain from diminishing, through the construction or maintenance of culverts under State owned roads and highways, the number of fish that would otherwise return

to or pass through the tribes' usual and accustomed fishing grounds and stations, to the extent that such diminishment would impair the tribes' ability to earn a moderate living from the fishery.

4.2 The State has violated, and continues to violate, the duty owed the plaintiff tribes under the Stevens Treaties to refrain from construction and maintenance of culverts that diminish the number of fish · that would otherwise return to or pass through the tribes' usual and accustomed fishing grounds and stations.

Prohibitory Injunction:

4.3 Prohibiting the State of Washington and each of its agencies, departments, officers, and agents from constructing or maintaining any culverts that reduce the number of fish that would otherwise return to or pass through the usual and accustomed grounds and stations of any plaintiff Tribe.

Mandatory Injunction:

Requiring State of Washington and each of its agencies, departments, officers, and agents:

4.4 To identify the location of all culverts constructed or maintained by any State agency or department, including, but not limited to, WSDOT, WDFW, and DNR, that diminish the number of fish that would otherwise return to or pass through the tribes' usual and accustomed fishing grounds and stations, within eighteen months of the date of judgment.

4.5 Within five years of the date of judgment, to fix and thereafter maintain all culverts

built or maintained by any State agency or department, including but not limited to WSDOT, WDFW a DNR, such that they do not diminish the number of fish that would otherwise return to or pass through the usual and accustomed fishing grounds and stations of the plaintiff tribes.

Other Relief:

4.6 To award Plaintiff-Intervenor Tribes their actual costs, of litigation, including reasonable attorneys' fees, together with such other relief as may be just, proper and equitable under the circumstances.

DATED this *12* day of *January*, 2001.

KANJI & KATZEN, PLLC

s/Phillip E. Katzen, per DAR
Phillip E. Katzen, WSBA #7835
Co-Counsel for the Suquamish, Jamestown, Lower Elwha, Pt. Gamble Bands of S'Klallams, Nisqually, Nooksack, Sauk-Suiattle, Skokomish, Squaxin Island, Stillagaumish, and Upper Skagit Tribes

s/Riyaz A. Kanji per DAR
Riyaz A. Kanji, WSBA #21039
Co-Counsel for the Suquamish, Jamestown, Lower Elwha, Pt. Gamble Bands of S'Klallams, Nisqually, Nooksack, Sauk-Suiattle, Skokomish, Squaxin Island, Stillagaumish, and Upper Skagit Tribes

RAAS, JOHNSEN & STUEN, P.S.

s/Daniel A. Raas
Daniel A. Raas, WSBA #4970
Harry L. Johnsen, WSBA #4955
Counsel for the Lummi Indian Nation

s/Richard Reich
Richard Reich, WSBA #8178
Counsel for the Quinault Indian Tribe

MORISSET SCHLOSSER
AYER et al.

s/Mason D. Morisset per DAR
Mason D. Morisset, WSBA #273
Counsel for the Tulalip Tribe

s/Michelle Hansen per DAR
Michelle Hansen, WSBA #14051

and

s/Kevin R. Lyon
Kevin R. Lyon, WSBA #15076
Counsel for the Squaxin Island Tribe

s/Scott Wheat per DAR
Scott Wheat, WSBA #25565
Co-Counsel for the Suquamish Indian Tribe

s/Annette M. Klapstein per DAR
Annette M. Klapstein, WSBA #9312

AND

s/Timothy Weaver per DAR
Timothy Weaver, WSBA #3364
Counsel for the Confederated Tribes and Bands of the Yakama Indian Nation

ZIONTZ, CHESTNUT, et al.

s/John Howard Bell per DAR
John Howard Bell, WSBA #5574
Counsel for the Puyallup Indian Tribe

s/John Arum per DAR
John Arum, WSBA #19813
Counsel for the Makah Indian Nation

s/Nettie Alvarez per DAR
Nettie Alvarez, WSBA #12283

AND

s/Alix Foster per DAR
Alix Foster, WSBA #4943
Counsel for the Swinomish Indian Tribal Community

s/Richard S. Ralston per DAR
Richard S. Ralston, WSBA #8546
Counsel for the Hoh Tribe

s/Richard A. Guest per DAR
Richard A. Guest, WSBA #26205
Co-Counsel for the Skokomish Indian Tribe

EISENHOWER, CARLSON, et al.

s/Tracey A. Thomson per DAR
Tracey A. Thomson, WSBA #24546
Co-Counsel for the Jamestown, Lower Elwa, and Pt. Gamble Bands of S'Klallams, and the Skokomish Indian Tribes

s/David Vogel per DAR
David S. Vogel WSBA #13672
Counsel for the Quileute Indian Tribe

s/Bill Tobin per DAR
Bill Tobin, WSBA #4397
Co-Counsel for the Nisqually Indian Tribe

EXHIBIT A

[PHILLIP E. KATZEN, PLLC letterhead]

June 16, 2000

The Honorable Christine Gregoire, Attorney General
Robert K. Costello, Senior Assistant Attorney General
P.O. Box 40100
Olympia, WA 98504-0100

Re: REQUEST TO MEET AND CONFER PURSUANT TO PARAGRAPH 25:
The State's Duty To Repair and Maintain State Owned Culverts To Prevent Blockage Of Anadromous Fish Passage

Dear General Gregoire and Mr. Costello:

The undersigned tribes request that you attend a conference to meet and confer regarding potential litigation in *United States v. Washington* on July 10, 2000, at 10:00 AM, in the conference room of Morisset, Schlosser, Ayer & Jozwiak.

This request is made pursuant to subparagraphs 25(a)(4) and (a)(7) of the Order Modifying Paragraph 25 of Permanent Injunction, entered in *United States v. Washington*, on August 23, 1993.

FACTUAL BACKGROUND

During the 1991-93, 1993-95, and 1995-97 biennia, the Washington Department of Fish and Wildlife (WDFW) and the Washington Department of Transportation (WSDOT) cooperated on an assessment of culverts that underlie State highways. Three reports were issued: Fish Passage Program

Progress Performance Report for the Biennium 1991-93; Fish Passage Program Progress performance Report for the Biennium 1993-95; and Fish Passage Program Department of Transportation Final Report (hereinafter 'Final Report'), dated June, 1997. These reports document the culvert study, the development of a methodology for assessing fish passage through culverts, the formulation of a Priority Index based on species of salmonid blocked by a culvert and based on the spawning and rearing habitat interdicted by the culvert, and a list of 177 WSDOT culverts which had been ranked as of the date of the Final Report. The Final Report notes that an additional 186 culverts had not yet been ranked.

The Final Report states that opening the ranked culverts would provide approximately 200,000 more adult salmonids per year to the State of Washington. We believe that number substantially understates the number of adult salmonids that could return were the culverts opened to fish passage. First, as acknowledged in the Final Report, the total would be higher if the additional 186 culverts were included in the assessment. Second, the Final Report deals only with culverts that block adult salmonids from returning to spawn; it does not address juvenile salmonids that are either unable to outmigrate, or are killed, as a result of culverts. Third, the Final Report does not estimate the total number of adult salmonids that could be expected to return if all the WSDOT culverts were opened to fish passage.

If the State Legislature continued to specially fund barrier culvert correction at the same levels that occurred in the 1993-95 and 1995-97 biennia, the Final Report estimates that the time for correction

would exceed 100 years. If WSDOT opened blocking culverts in conjunction with its other highway repair and maintenance projects, the Final Report estimates it would take two to three decades to complete the repair of the barrier culverts.

Most of these fish blocking culverts reduce the productive habitat available for salmonids that return to or pass through *United States v. Washington* case area tribal usual and accustomed fishing grounds and stations. This reduction of productive salmonid habitat caused by blocking culverts is in part responsible for the reduction of the numbers of harvestable fish available to the tribes, which in turn is in part responsible for the failure of the tribes to achieve a moderate living through their treaty reserved fishery.

RELIEF THAT WILL BE REQUESTED

If this matter proceeds to litigation, the tribes will seek at least the following relief:

(1) A declaratory judgment that:

(a) The treaties between the tribes and the United States impose on the State of Washington and its agencies the duty to refrain from constructing and maintaining culverts beneath State highways that block passage of fish that would otherwise return to or pass through tribal usual and accustomed grounds and stations, where such blockage impairs the tribes' ability to achieve a moderate livelihood from the fishery, and

(b) The State's construction and maintenance of culverts beneath State highways that block fish

passage to spawning and rearing habitat violates this duty.

(2) An injunction that:

(a) Prohibits the State of Washington, and its State agencies, from constructing or maintaining any culverts beneath State highways that block passage of fish that would otherwise return to or pass through tribal usual and accustomed grounds and stations, and

(b) Requires the State of Washington, and its State agencies, to establish 100% fish passage through all culverts beneath State highways that block passage of fish that would otherwise return to or pass through tribal usual and accustomed grounds and stations within a period of time to be established by the Court, and to thereafter maintain those culverts to ensure that 100% fish passage is preserved.

PARAGRAPH 25(b)(l) REQUIREMENTS

A. The basis for the relief stated above is the State's duty, pursuant to the Stevens' Treaties, to refrain from impairing the tribes' ability to achieve a moderate living from their fisheries, including the duty to refrain from actions that block access to spawning and rearing habitat such that the number of fish that would return to or pass through tribal usual and accustomed fishing areas is reduced. The State has violated that duty because the continuing harm to the fishery habitat caused by these culverts has contributed to the reduction in the tribes' harvest below the number of fish needed for the tribes to attain a moderate living from their fisheries.

B. Settlement is possible if the State acknowledges in an enforceable court order:

(1) that it has a duty pursuant to the Stevens treaties to refrain from degrading the fish habitat by blocking access to salmon spawning and rearing habitat through the construction and maintenance of fish blocking culverts as alleged herein to the extent that the tribes' ability to achieve a moderate living from the fishery is impaired;

(2) that it violated this duty;

(3) that it will refrain in the future from violating or avoiding this duty; and

(4) that mitigation measures for the damage caused by its actions will be completed in a timely manner. A timely manner for the purposes of the State highway fish blocking culverts is substantially less than the 20 to 30 year period estimated in the Final Report.

C. This matter is not appropriate for the Fisheries Advisory Board.

D. Technical issues concerning culvert construction and repair, if any, may be capable of resolution by agreement.

E. No independent regulatory action can resolve this controversy because acknowledgement and implementation of the treaty right are at the heart of this dispute.

F. Earlier opinions in this case by the District Court and the Ninth Circuit addressed the existence of the State's duty under the Stevens' Treaties to refrain from actions that adversely affect fish

habitat. Those opinions did not resolve the issue; the Ninth Circuit held that resolution of the issue would depend upon concrete facts which underlie a dispute in a particular case. The case presented here provides a specific fact based situation which satisfies the Ninth Circuit's requirements for resolution of this issue.

Earlier rulings in this case by the District Court, the Ninth Circuit, and the Supreme Court, however, have established that the tribes' rights to take fish are "secured" by the treaties, that those rights are permanent, and that the State may not permit the subject matter of the treaties to be destroyed. Earlier rulings in other cases have also established that a reservation of rights in a treaty includes by implication whatever is necessary to make the reservation of those rights effective.

G. The parties may be able to resolve this dispute by mediation. It is not capable of arbitration.

If the date and time identified above are not convenient, please contact us so that we may reschedule to a mutually acceptable date and time. We look forward to meeting with you and the State's policy representatives to discuss the resolution of the issues described above.

Very truly yours,

*Daniel A. Raas**
Daniel A. Raas/Harry L. Johnsen
Attorneys for Lummi Nation

Philip E. Katzen
Philip E. Katzen
Attorney for Nooksack, Upper Skagit, Sauk Suiattle, Stillaguamish, Nisqually, Squaxin Island, Suquamish, Skokomish, Port Gamble S'Klallam, and Jamestown S'Klallam Indian Tribes

*Mason D. Morisset**
Mason D. Morisset
Attorney for Tulalip Tribes

*Alix Foster**
Alix Foster
Attorney for Swinomish Indian Tribal Community

*John B. Arum**
John B. Arum
Attorney for Makah Indian Tribe

*Richard Reich**
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Attorney for Quinault Indian Nation

*Richard Ralston**
Richard Ralston
Attorney for Hoh Indian Tribe

*Kevin Lyon**
Kevin Lyon
Co-Counsel for Squaxin Island Indian Tribe

*Harold Chesnin**
Harold Chesnin
Co-Counsel for Upper Skagit Indian Tribe

*Bill Tobin**
Bill Tobin
Co-Counsel for Nisqually Indian Tribe

*David Vogel**
David Vogel
Co-Counsel for Stillaguamish Indian Tribe

*Scott Wheat**
Scott Wheat
Co-Counsel for Suquamish Indian Tribe

**Per Telephone Authorization*

C: Client Tribes
Peter Monson

RECEIVED
Jan 19 2001
OFFICE OF ATTORNEY GENERAL
FISH & WILDLIFE DIVISION

HONORABLE
BARBARA JACOBS ROTHSTEIN

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT
OF WASHINGTON

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHIGNTON, et al., Defendants.	Civil No. C70-9213 – Phase I Sub-proceeding No. 01-01 (Culverts) UNITED STATES' RESPONSE TO REQUEST FOR DETERMINATION

The United States of America hereby responds to the Request for Determination filed in this matter as follows:

INTRODUCTION AND DESCRIPTION OF THE SUB-PROCEEDING

This section contains a description of this sub-proceeding, to which no response is required. As described more fully *infra*, the United States supports generally the Tribes' request.

I. PRELIMINIARY MATTERS

1.1 Admitted

1.2 Admitted. Representatives of the United States also attended the meeting.

1. 3. Admitted.

1.4. No representative of the United States was invited to the "government to government" meeting and thus the United States can neither admit nor deny the statements contained in this paragraph, other than to admit, upon information and belief, that such a meeting occurred.

1.5. Admitted. The United States attended and participated in the mediation.

II. ESTABLISBED LAW AND ACTS

2.1. Admitted.

2.2. Admitted.

2.3. Admitted.

2.4. Admitted.

2.5. Admitted.

2.6. Admitted.

2.7. Admitted.

III. OPERATIVE FACTS: FISH BLOCKING CULVERTS

3.1. Admitted.

3.2. Admitted.

3.3. Admitted.

3.4. The United States is without information with which to verify the truth of this statement, but upon information and belief it is admitted.

3.5. Admitted.

3.6. Admitted.

3.7. This paragraph summarizes the conclusions of voluminous reports, which reports speak for themselves.

3.8. This paragraph summarizes the conclusions of voluminous reports, which reports speak for themselves.

3.9. This paragraph summarizes the conclusions of voluminous reports, which reports speak for themselves.

3.10. The United States is without information with which to verify the truth of these statements, but upon information and belief they are admitted.

3.11. The United States is without information with which to verify the truth of these statements, but upon information and belief they are admitted.

3.12. Admitted.

3.13. Admitted.

3.14. Admitted as to the year 1994 and before. *United States v. Washington*, 873 F.Supp. 1422, 1445-1446 (W.D. Wash. 1994) *aff'd.* 14157 F.2d 630 (1998) *cert. denied* 526 U.S. 1060 (1990). The United States is without information with which to verify the truth of this statement as to years after 1994, but it knows of no change in circumstances which would alter the conclusions reached by this Court in 1994.

IV. DEMAND FOR JUDGMENT

The United States requests that this Court enter an order declaring the rights of the parties and enjoining their actions as follows:

Declaratory Judgment.

The United States requests that the Court declare that:

4.1. The right of taking fish secured to the plaintiff tribes in the Stevens Treaties imposes a duty upon the State of Washington to refrain from degrading the fishery resource through the construction or maintenance of culverts under State owned roads and highways in a way that deprives the Tribes of a moderate living from the fishery.

4.2. The State has violated and continues to violate the duty owed to the plaintiff tribes under the Stevens Treaties through the operation and maintenance of culverts which reduce the number of fish that would otherwise return to or pass through the Tribes' usual and accustomed fishing grounds and stations to such a degree as would deprive the Tribes of the ability to earn a moderate living from the fishery.

4.3. The Ninth Circuit held that the legal standards that govern the State's precise obligations and duties under the Treaties with respect to State actions that may affect the environment of the treaty area will depend upon concrete facts which underlie a particular case. In the context of State culverts that appreciably degrade fish passage and interfere with the Tribes' ability to realize a moderate living from the fishery, the State's obligations include the duty to correct in a timely way the fish passage problems associated with the culverts.

Prohibitory Injunction:

The United States seeks an Order that:

4.4. Prohibits the State of Washington, and each of its agencies, departments, officers, employees, contractors and agents from constructing, operating, or maintaining any culvert in a manner that would deprive the Tribes of the ability to earn a moderate living from the fishery. Those culverts that are designed, built, and maintained consistent with the current best available design and engineering standards relating to the passage of fish under highways would not be subject to the injunction as they would not appreciably degrade the fishery, thereby, limiting the ability of the plaintiff-Tribes to earn a moderate living from the fishery.

Mandatory Injunction:

The United States seeks an Order that:

4.5. Requires the State of Washington and each of its agencies, departments, officers, employees, contractors and agents to identify, within eighteen months of the date of judgment (or such other time period as the Court shall deem necessary and just) the location of all culverts owned, constructed or maintained by any State agency or department, including the Washington State Department of Transportation, the Washington Department of Fish and Wildlife, and the Washington Department of Natural Resources, that degrade appreciably passage of fish that otherwise would pass through usual and accustomed fishing grounds and stations so as to deprive the Tribes of the ability to earn a moderate living from the fishery.

4.6. Requires that, within five years of the date of judgment (or such other time period as the Court deems necessary and just) the State of Washington

and each of its agencies, departments, officers, employees, contractors and agents shall repair, retrofit, maintain, or replace the culverts identified under Paragraph 4.5, in conformity with the best available design and engineering standards for passage of fish beneath highways, as necessary, to avoid depriving the Tribes of the ability to earn a moderate living from the fishery.

Other Relief:

4.7. The United States further requests the Court to award to the United States such other relief as the Court shall deem just, proper, and equitable, including costs of litigation.

RESPECTFULLY SUBMITTED this 16th day of January, 2001.

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FILED — ENTERED
LODGED — RECEIVED
• Mar 16 2001 •
AT SEATTLE
CLERK U.S. DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
BY DEPUTY

THE HONORABLE
BARBARA JACOBS ROTHSTEIN

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHIGNTON, et al., Defendants.	CIVIL NO. C70-9213-Phase II [Sub-Proceeding No. 01-01 (Culverts)] STATE OF WASHINGTON'S ANSWER AND CROSS AND COUNTER REQUESTS FOR DETERMINATION

ANSWER

The State of Washington (hereinafter "State") submits the following Answer to the "Request for Determination" (hereinafter "RFD"):

INTRODUCTION AND DESCRIPTION OF THE "SUB-PROCEEDING"

This section contains the Tribes' description of this "sub-proceeding" to which no response is required.

I. STATE RESPONSE TO TRIBES' "PRELIMINARY MATTERS"

1.1 By way of answer to ¶1.1 of the RFD, the State admits that venue is proper in this Court. As explained elsewhere in this Answer, the State denies that a case or controversy exists. The State specifically reserves the right to raise an Eleventh Amendment defense if future circumstances justify the defense. The State denies that the August 23, 1993 Order Modifying Paragraph 25 of the Permanent Injunction, without more, provides this Court with jurisdiction and venue. The State avers that this matter is governed by the Court's June 22, 1993 Order Dismissing Without Prejudice Phase II and Certain Subproceedings in Phase I.

1.2 The State admits the allegations in ¶1.2.

1.3 The State admits the allegations in ¶1.3.

1.4 The State admits the allegations in the first two sentences of ¶1.4. The State admits the third sentence with the following explanation: At all times the State has been willing to discuss a settlement related to the prioritization process or remedial timetable for fixing State-owned culverts. The Tribes demanded, however, that the State admit the existence of some treaty-based right to environmental protection of indeterminate scope. All involved, including the Governor and the tribal officials, recognized that the parties had reached an impasse. The State admits the final sentence in ¶1.4.

1.5 The State admits the allegations in ¶1.5.

II. STATE RESPONSE TO TRIBES' "ESTABLISHED LAW AND FACTS"

2.1 The State admits the allegations in ¶2.1.

2.2 The State admits only that the allegations in ¶2.2 resemble sentences in a paragraph from the decision in *Washington v. Washington State Commercial Passenger Fishing Vessel Association,* 443 U.S. 658, 668 (1979) (hereinafter *Passenger Fishing Vessel*). The State lacks knowledge sufficient to form a belief as to the truth of the remaining averments in ¶2.2 and therefore denies all allegations not specifically admitted.

2.3 The State admits only that the allegations in ¶2.3 resemble sentences in a paragraph from the decision in *Passenger Fishing Vessel,* 443 U.S. at 668. The State lacks knowledge sufficient to form a belief as to the truth of the remaining averments in ¶2.3 and therefore denies all allegations not specifically admitted.

2.4 The State admits only that Judge Boldt made a similar finding that the Supreme Court acknowledged in *Passenger Fishing Vessel,* 443 U.S. at 669 and n.14, and denies the remaining allegations in ¶2.4.

2.5 The State admits the allegation in ¶2.5. The State avers that many of the fish harvested by the Tribes in 1986 included hatchery-spawning fish and Fraser River salmon, whose life history is affected minimally or not at all by State-owned culverts.

2.6 The State admits the allegation in ¶2.6. The State avers that annual harvests fluctuate for many reasons and that conditions unrelated to State-

owned culverts contributed to the poor 1999 harvest. Such reasons include low numbers of Fraser River salmon, a decline in the chum population, and extremely poor hatchery survival rates.

2.7 By way of answer to ¶2.7, the State denies that State-owned culverts have cause significant decline in the number of fish harvested by the plaintiff Tribes since 1986. The number of State-highway culverts did not significantly increase between 1974 and 1986. Since 1986, the number of State-highway culverts that constitute fish passage barriers has declined due to the State's fish passage barrier remediation programs pursuant to state law.

III. STATE RESPONSE TO TRIBES' "OPERATIVE FACTS: FISH BLOCKING CULVERTS"

3.1 By way of answer to the allegations in ¶3.1, the State admits that roadway stream crossings must provide for some means to convey water through or under the roadway and that bridges and culverts are typically used for this purpose. The State avers that culverts that are properly designed, constructed and maintained generally will not impede fish passage. Some culverts designed and constructed according to appropriate standards have become fish passage barriers over time due to erosion, catastrophic events such as earthquakes, and other natural processes. In addition, scientific research (much of which has been funded by the Washington State Department of Transportation (WSDOT) and the Washington Department of Fish and Wildlife (WDFW)) has led to a better understanding of fish behavior and their ability to navigate culverts. Design

and construction standards that were at one time believed to provide adequate fish passage are now recognized as inadequate in some cases. The State denies all remaining allegations not specifically admitted.

3.2 By way of answer to ¶3.2, the State admits that some culverts are a current and generally correctable cause of fish habitat unavailability. The State denies all remaining allegations not specifically admitted.

3.3 By way of answer to ¶3.3, the State admits that road-related fish passage barriers have reduced the available fish habitat. The State avers that correcting the State-owned fish passage barrier culverts that have been identified to-date is estimated to cost hundreds of millions of dollars. In addition to the high cost (and competing demands for limited State funding), factors such as the limited availability of qualified design and construction personnel, limited time periods for conducting in-stream work, and the lengthy permitting time mean that barrier correction will take substantially longer than five years. The State therefore denies that the fish passage barrier culvert problem "can be easily resolved."

3.4 The State admits the allegation in ¶3.4.

3.5 The State admits that WSDOT and the Washington Department of Fisheries commenced an inventory of state highway stream crossings in Washington State to determine which stream crossings blocked passage to anadromous fish classified as "food fish" under state law. The State further avers that WSDOT and WDFW are now conducting a second inventory of stream crossings on

the state highway system to determine which stream crossings block fish passage. The second inventory considers resident fish and steelhead as well as anadromous fish classified as "food fish." WSDOT and WDFW estimate that the new inventory will be completed in approximately five years. It is unlikely that the new inventory could be completed in less time. The State denies all remaining allegations not specifically admitted.

3.6 By way of answer to ¶3.6, the State admits that it published the reports identified in that paragraph as well as subsequent reports documenting the progress of the State's fish passage barrier remediation program being conducted under State law.

3.7 By way of answer to ¶3.7, the State admits that one of the historical reports identified in ¶3.6 contains the figures stated in this paragraph. The State avers that since 1991, the WSDOT/WDFW fish passage barrier removal program conducted under State law has opened over 147 linear miles of stream habitat and restored over 908,000 square meters of salmonid habitat. The State denies all remaining allegations not specifically admitted.

3.8 By way of answer to ¶3.8, the State admits that one of the historical reports identified in ¶3.6 contains the theoretical estimate that the Tribes set forth in this paragraph. The State avers that the estimate assumes that salmon populations are limited only by the amount of available habitat. Whether the barrier removal projects will actually achieve this potential increase in fish production is dependent on many biological and environmental variables

unrelated to the culverts. The State admits that the Tribes would have a right to take a share of the harvestable fish that pass through tribal usual and accustomed grounds and stations. The State denies all remaining allegations not specifically admitted.

3.9 By way of answer to ¶3.9, the State admits that one of the historical reports identified in ¶3.6 states that if only dedicated funding at the then-current level were used to repair barrier culverts, complete resolution would require about 100 years. The State avers that the same report also states that WSDOT's program of fixing barrier culverts encountered during the course of transportation projects would lead to complete resolution in two to three decades. Under the funding levels WSDOT has requested of the Legislature, WSDOT estimates that the identified fish passage barriers will be corrected in 20 years or less. WSDOT has already corrected approximately 70 of the barriers expected to yield the most significant increases in available fish habitat.

The remaining WSDOT fish passage barriers have been or are being prioritized for correction to ensure that available funds are spent on projects that provide the greatest potential for increased fish habitat and fish production. The State denies all remaining allegations not specifically admitted.

3.10 By way of answer to ¶3.10, the State admits that other State agencies or departments, including the Washington Department of Fish and Wildlife and the Washington Department of Natural Resources, operate and maintain roads on State-owned lands that contain some culverts that are fish passage barriers. The State denies all remaining allegations not specifically admitted.

3.11 The State admits the allegation in ¶3.11.

3.12 By way of answer to ¶3.12, the State avers that State-owned culverts have been a factor in making some potential fish habitat inaccessible. The relationship between accessible fish habitat and harvestable fish depends on many other factors unrelated to culverts, however. These factors include but are not limited to ocean and estuary conditions, hatchery survival rates, harvest levels, dams, and predator behavior. The interplay of these factors and fish behavior determines whether the opening of new habitat will result in larger numbers of harvestable fish or will simply redistribute the existing population levels. The State denies that State-owned culverts have been a significant cause of decline in the tribal fish harvest since 1986. Since 1986, the number of State-highway culverts that constitute fish passage barriers has declined due to the State's fish passage barrier remediation programs. The State denies all remaining allegations not specifically admitted.

3.13 The State lacks knowledge sufficient to form a belief as to the truth of the averments in ¶3.13 and therefore denies those averments.

3.14. The State lacks knowledge sufficient to form a belief as to the truth of the averments in ¶3.14 and therefore denies those averments.

3.15. The State denies all allegations in the RFD not specifically admitted and all allegations of unlawful behavior contained in the RFD.

IV. STATE RESPONSE TO TRIBES' AND UNITED STATES' "DEMANDS FOR JUDGMENT"

To the extent a response to the demands for judgment in the Tribes' RFD and the United States' Response to Request For Determination is deemed necessary, the State provides the following:

For the factual and legal reasons stated elsewhere in this Answer and Cross- and Counter-Request For Determination, the Tribes are not entitled to the relief requested in Part IV of their RFD, and the United States is not entitled to the relief requested in part IV of its Response.

V. ADDITIONAL FACTS AND LAW SUPPORTING STATE'S DEFENSES AN CROSS- AND COUNTER-REQUESTS FOR DETERMINATION

By way of further answer, and in support of the State's defenses, cross-request for determination, and counter-request for determination, the State avers as follows:

5.1 The United States is a party to treaties with the plaintiff Tribes. Only Congress can modify or abrogate the terms of Indian treaties, and when it does so it must make its intent clear and plain. Federal executive agencies have a duty to ensure that the Tribes' treaty rights are not abrogated or impinged upon when those agencies fund, authorize, approve, or otherwise participate in actions of the State of Washington and its agencies.

5.2 In 1996, the Washington Department of Natural Resources (DNR) applied to the federal

government for an incidental take permit under Section 10 of the Endangered Species Act (ESA) for activities relating to DNR's management of approximately 1.6 million acres of State-owned trust lands, including lands within the *United States v. Washington* "case area." As part of its application, the DNR prepared a "habitat conservation plan" (HCP). The HCP includes provisions for road system management. Those provisions require DNR to identify fish blockages caused by stream crossings and prioritize their retrofitting or removal on lands west of the Cascade crest.

5.3 At no time during the permit application process did the federal government inform DNR that any treaties would be violated if DNR implemented the culvert remediation strategy proposed in the HCP.

5.4 In 1997, the United States Fish and Wildlife Service (USFWS), an agency within the United States Department of the Interior, granted DNR's application for an incidental take permit and approved the HCP. The USFWS published a notice of its approval in the February 27, 1997 issue of the Federal Register. In that notice, the USFWS recognized that the HCP addressed "anadromous salmonids which are a resource subject to the Fish and Wildlife Service's trust responsibility," and announced it was issuing the permit because the HCP met the USFWS's "trust responsibility to Native American Tribes."

5.5 On January 30, 1997, the DNR entered into a 70-year "Implementation Agreement" with the United States Secretaries of Commerce and the Interior concerning the HCP. In the Implementation

Agreement, the Secretaries promised not to require DNR to take additional measures or allocate additional funds beyond the commitments in the HCP absent unforeseen or extraordinary circumstances. At no time has the Secretary of Commerce or the Secretary of the Interior claimed that unforeseen or extraordinary circumstances are present. At no time has the Secretary of Commerce or the Secretary of the Interior taken the position that DNR is violating the HCP or the Implementation Agreement.

5.6 In implementing its road culvert remediation program on State-owned trust lands, the State reasonably relied on the federal government's approval of the DNR HCP, including its representations that the HCP satisfied any "trust responsibility to Native American Tribes."

5.7 In June 1997, the United States Secretaries of Commerce and the Interior issued a "Secretarial Order" on "American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act" ("Secretarial Order"). The Secretarial Order pledges that the Departments of Commerce and the Interior "will carry out their responsibilities under the [Endangered Species] Act in a manner that harmonizes the Federal trust responsibility to tribes, tribal sovereignty, and statutory missions of the Department." The Secretarial Order sets forth a policy that, when the National Marine Fisheries Service (NMFS), an agency within the United States Department of Commerce, exercises regulatory authority under Section 4(d) of the ESA, it shall avoid or minimize effects on the exercise of reserved Indian fishing rights to the maximum extent allowed by law.

5.8 During the 1990s, DNR worked with other Washington State agencies, the plaintiff Tribes, and others to develop proposals to improve and protect fish habitat on non-federal forestlands in Washington. They released the proposals in 1999 in the "Forests and Fish Report." The "Forests and Fish Report" proposes that fish-blocking culverts on forest roads be repaired by 2015.

5.9 In 2000, the NMFS adopted a rule under Section 4(d) of the Endangered Species Act prohibiting the take of salmon listed as "threatened" under that Act. NMFS stated that maintaining fish passage barriers can be a "take." But NMFS said it may exempt from the "take" prohibition activities conducted in accordance with the Forests and Fish Report, including the 15-year period for remediation of fish passage problems on state forest roads. The NMFS knew or should have known of any United States treaty obligations. The NMFS had a duty to ensure that the Tribes' treaty rights were not abrogated or impinged upon when it adopted its 4(d) rule, and, according to the Secretarial Order, NMFS was supposed to avoid affecting the exercise of Indian treaty fishing rights to the maximum extent allowed by law. The State reasonably concluded that by approving or failing to object to the State's 15-year remediation schedule for forest roads, the NMFS had determined that the schedule satisfied any treaty obligation.

5.10 The United States Congress has appropriated funds to carry out the proposals in the Forests and Fish Report. The Congress did not make clear and plain any intent to abrogate or modify treaty rights when it made that appropriation. The State

reasonably concluded that the Congress had determined that the Forests and Fish Report, including its 15-year schedule for remediation of fish passage problems on forest roads, was consistent with any treaty obligation.

5.11 Some of the plaintiff Tribes agreed with the Forests and Fish Report. The State reasonably believed that these plaintiff Tribes had concluded that the Forests and Fish Report, including its 15-year schedule for remediation of fish passage problems on forest roads, satisfied any treaty obligation that the State may owe to the Tribes. If those actions do not satisfy some treaty-based duty, the State has relied to its detriment on the actions of these plaintiff Tribes.

5.12 The United States Environmental Protection Agency (EPA) has delegated to the Washington Department of Ecology the authority to set water quality standards under Section 303 of the federal Clean Water Act. The EPA retains authority to determine whether the State's water quality standards are consistent with the Clean Water Act. In exercising such authority, the EPA has a duty to ensure that the Tribes' treaty rights are not abrogated or impinged upon.

5.13 As part of Washington State's implementation of the Forests and Fish Report, the Washington Department of Ecology has adopted interim forest practices rules for water quality, including rules for forest roads. These interim rules incorporate the 15-year road remediation schedule of the Forests and Fish Report. At no time has the EPA informed the State that the interim rules are inconsistent with the Clean Water Act or the Tribes'

treaty rights. The State reasonably concluded that by approving or failing to object to the State's 15-year remediation schedule for forest roads, the EPA had determined that the schedule satisfied any treaty obligation.

5.14 Many of the fish passage barrier culverts in the WSDOT inventory are in highways funded in part by the United States under the Federal Aid Road Act of 1916 and successor legislation. These highways were designed according to standards set or approved by the Federal Highway Administration (FHWA) and its predecessors. The FWHA *[sic]* retained authority for final design approval. The FHWA knew or should have known of any United States treaty obligations. The FHWA has a duty to ensure that the Tribes' treaty rights are not abrogated or impinged upon when it sets design standards, approves designs, and monitors maintenance on federal-aid highways. The State reasonably concluded that by approving or failing to object to the State's culvert design and maintenance, the FHWA had determined that the design and maintenance satisfied any treaty obligation. WSDOT used the same culvert design and maintenance standards on its other roads that were not funded under federal highway-aid legislation.

5.15 When Washington state agencies install culverts, they must comply with the federal Clean Water Act. Since 1977, the United States Army Corps of Engineers has issued nationwide permits under Section 404 of the Clean Water Act for certain activities, including the installation of culverts. The State of Washington has installed culverts in reliance on such permits. The Corps of Engineers has a duty to ensure that the Tribes' treaty rights are not abrogated

or impinged upon when it administers the Clean Water Act. Since 1986, the Corps of Engineers has required as a General Condition of its nationwide permits that activities performed under the permits not impair tribal reserved rights, including, but not limited to, treaty fishing rights. The Corps of Engineers has never informed the State of Washington that any of its culvert installation activities impair treaty fishing rights or violate any nationwide permit. The State reasonably concluded that by approving or failing to object to the State's culvert design, the Corps of Engineers had determined that the design satisfied any treaty obligation.

5.16 When Washington state agencies install some culverts in waters of the United States, they must secure individuals permit from the United States Army Corps of Engineers for the installation. The Corps of Engineers knew or should have known of any United States treaty obligations. The Corps of Engineers has a duty to ensure that the Tribes' treaty rights are not abrogated or impinged upon when it issues permits. The Corps of Engineers has never denied a culvert installation permit on the basis that it abrogated or impinged upon Indian treaty rights. The State reasonably concluded that by approving or failing to object to the State's culvert design, the Corps of Engineers had determined that the design satisfied any treaty obligation.

5.17 Section 7 of the federal Endangered Species Act requires federal agencies to consult with the United States Secretary of the Interior or Commerce to insure that actions they authorize or fund do not jeopardize the continued existence of any

endangered or threatened species or result in the destruction or adverse modification of critical habitat. In June 1997, the United States Secretaries of Commerce and the Interior issued the Secretarial Order described in ¶5.7 of this Response. The Secretarial Order pledges that the Departments of Commerce and the Interior "will carry out their responsibilities under the [Endangered Species] Act in a manner that harmonizes the Federal trust responsibility to tribes, tribal sovereignty, and statutory missions of the Department." The Secretarial Order sets forth an agency policy that, when federal agencies consult with NMFS or USFWS under Section 7 of the ESA on a proposed action that may affect tribal rights, NMFS or USFWS shall notify affected Tribes, give full consideration to tribal comments, and strive to ensure that any reasonable and prudent alternatives to the proposed action not discriminate against Tribes.

5.18 The United States Army Corps of Engineers authorizes, and the FHWA funds, some WSDOT highway construction work. NMFS and the USFWS have collectively reviewed hundreds of WSDOT road projects as required by § 7 of the ESA, including many since the Secretarial Order was issued in June 1997. NMFS and the USFWS have a duty to ensure that the Tribes' treaty rights are not abrogated or impinged upon when they consult under § 7 of the ESA. Since June 1997, NMFS and the USFWS have been guided by the Secretarial Order, which requires them to coordinate with Tribes and avoid discriminatory impacts on Tribes when they consult on actions that may affect tribal rights. These federal agencies have routinely approved WSDOT

culvert designs and have never expressed any concern that WSDOT culverts may adversely affect tribal rights. The State reasonably concluded that by approving or failing to object to the State's culvert design, these federal agencies had determined that the design satisfied any treaty obligation.

5.19 In June 1997, the United States Secretaries of Commerce and the Interior issued the Secretarial Order described in paragraphs 5.7 and 5.17 of this Response. The Secretarial Order pledges that the Departments of Commerce and the Interior "will carry out their responsibilities under the [Endangered Species] Act in a manner that harmonizes the Federal trust responsibility to tribes, tribal sovereignty, and statutory missions of the Department." The Secretarial Order sets forth a policy that, when NMFS exercises regulatory authority under Section 4(d) of the ESA, it shall avoid or minimize effects on the exercise of reserved Indian fishing rights to the maximum extent allowed by law.

5.20 The NMFS has adopted a rule under § 4(d) of the ESA that prohibits the taking of threatened salmon, subject to certain exceptions that NMFS deems to contain adequate safeguards. One such exception applies to employees or agents of a state conducting routine road maintenance activities under a program substantially similar to that of the Oregon Department of Transportation. In June 2000, WSDOT requested that NMFS include WSDOT's routine road maintenance activities performed according to the WSDOT "Maintenance Manual for Water Quality and Habitat Protection" in the 4(d) rule. WSDOT's current maintenance activities conform to the protocols in this manual and meet or

exceed the standards in the Oregon DOT manual. The WSDOT manual contains protocols for inspecting culverts and maintaining fish passage through the culverts. The NMFS had a duty to ensure that the Tribes' treaty rights were not abrogated or impinged upon when it adopted its 4(d) rule, and according to the Secretarial Order NMFS was supposed to avoid affecting the exercise of Indian treaty fishing rights to the maximum extent allowed by law. The State reasonably concluded that by approving or failing to object to the ODOT routine maintenance program, or Washington's "Maintenance Manual for Water Quality and Habitat Protection," the NMFS had determined that these maintenance activities satisfied any treaty obligation.

5.21 Washington State law has long required that anyone constructing a hydraulic project in a stream must obtain a Hydraulic Project Approval from the WDFW or its predecessors to ensure the proper protection of fish life. WDFW has developed extensive design criteria for all hydraulic conveyances, which are the state-of-the-art. All new culverts installed on state roads and highways must conform to these criteria. In its Federal Register document adopting a rule prohibiting the take of threatened salmon under Section 4(d) of the ESA, the NMFS praised the WDFW criteria as an excellent framework for making decisions on culverts and road crossings and as ensuring adequate fish passage. NMFS has adopted these criteria in its own documents. The NMFS has a duty to ensure that the Tribes' treaty rights are not abrogated or impinged upon. According to the Secretarial Order, when NMFS adopted its 4(d) rule it was supposed to avoid affecting

the exercise of Indian treaty fishing rights to the maximum extent allowed by law. The State reasonably concluded that by approving or failing to object to the State's culvert design, the NMFS had determined that the design satisfied any treaty obligation.

5.22 As described in paragraphs 5.2 through 5.10 and 5.12 through 5.21 above, the United States has funded, authorized, approved, or otherwise participated in the design, construction and maintenance of many of the State's culverts. The United States has funded, authorized, approved, or otherwise participated in the State's proposals to correct fish passage problems on state-owned roadways. The State of Washington reasonably concluded that the United States had determined that the state actions described in paragraphs 5.2 through 5.21 satisfied any treaty obligation. If those actions do not satisfy some treaty-based duty, the State has reasonably relied to its detriment on the actions of the United States. The United States has a duty to pay all costs incurred by the State to identify and fix any and all barrier culverts. As described below, the United States also has a duty to take action on its own lands so as not to place on the State of Washington an unfair burden of complying with any such treaty-based duty.

5.23 Any treaty-based duty owed by the State to the Tribes must also be owed by the United States to the Tribes.

5.24 The United States, as a land owner, owes a duty to the State not to use its land in such a way as to injure the State. This includes a duty that the United States assume its fair share of the burden of

complying with any treaty-based duty to protect fish habitat.

5.25 Federal agencies own about 7000 miles of public road within the State of Washington. These agencies include the United States Forest Service, the Bureau of Indian Affairs, the National Park Service, the United States military departments and others. In addition to these public roads, federal agencies such as the United States Forest Service manage federal lands within the case area that contain tens of thousands of miles of other roads that are poorly designed and maintained. With respect to the design, construction, and maintenance of culverts and other road-related hydraulic conveyances, the State's standards and practices meet or exceed those of the federal agencies. Roads on federal lands within the *United States v. Washington* "case area" include a very large number of fish passage barriers.

5.26 Upon information and belief, the federal government has not completed an inventory of its own fish passage barriers in the case area. If the federal government had an accurate inventory of its own road-related fish passage barriers, it is likely that the amount of potential salmon habitat made inaccessible by federal barriers would equal or exceed any amount of potential habitat made inaccessible by State-owned culverts.

5.27 In addition to the federal culvert problem, the United States and its agencies have caused widespread destruction of fish habitat within the State of Washington. Destruction of fish habitat by the United States has reduced the number of fish passing through the Tribes' usual and accustomed

fishing grounds and stations and has reduced the tribal harvest. The loss of harvestable fish attributable to these federal actions exceeds any loss reasonably attributable to State-owned culverts.

5.28 Any treaty-based duty to protect fish habitat owed by the State to the Tribes must also be owed by the Tribes to the State.

5.29 Upon information and belief, some or all of the plaintiff Tribes own or maintain roads and have not inventoried or corrected their own road-related fish passage barriers.

5.30 Washington State and territorial law has long required that obstructions across or in streams be provided with a durable and efficient fishway. Washington law has required that such fishways be maintained in an effective condition and continuously supplied with sufficient water to freely pass fish.

5.31 A principal purpose of the treaties was to extinguish Indian claims to the land in Washington Territory. The United States negotiators anticipated industrial and urban development in the relevant geographical area. At least some of the Tribes understood that the United States or the settlers would build public roads, and that the Indians would be able to use them. Governor Stevens and the treaty commissioners were not authorized to grant to the Indians or treat away on behalf of the United States any governmental authority of the United States. The Indians ceded and relinquished all right, title, and interest in most of what is now western Washington, reserving certain specifically-stated off-reservation rights, such as the "right of taking fish, at all usual and accustomed grounds and stations . . . in common

with all citizens . . . ." There is no mention in the treaties of a duty to protect fish habitat.

5.32 Washington State was admitted to the Union in 1889. When Congress provided for the admission of the State of Washington, it said the State would be admitted "on an equal footing with the original States." The original States do not have the duty that the Tribes allege in the RFD or the duty that the United States alleges in its Response. There is no mention of such a duty in the 1889 Enabling Act.

5.33 The treaties do not give the Tribes or the United States the power to control the state legislative process so as to dictate to the people of the State of Washington or their representatives how they shall allocate scarce state resources.

VI. STATE'S DEFENSES

6.1 The United States and the Tribes are barred by principles of waiver and/or estoppel from seeking any relief related to culverts owned by the Washington Department of Natural Resources on roads within lands covered by the DNR's Habitat Conservation Plan.

6.2 The United States and the Tribes are barred by principles of waiver and/or estoppel from seeking any relief related to culverts on lands covered by the State's Forests and Fish Report.

6.3 The United States and the Tribes are barred by principles of waiver and/or estoppel from seeking any relief related to the State's design, construction, and maintenance of culverts on federal-aid highways and on other state highways designed,

constructed, and maintained in accordance with the standards for federal-aid highways.

6.4 The United States and the Tribes are barred by principles of waiver and/or estoppel from seeking any relief related to the State's installation of culverts under nationwide permits or individual permits issued by the United States Army Corps of Engineers.

6.5 The United States and the Tribes are barred by principles of waiver and/or estoppel from seeking any relief related to the State's installation of culverts in projects that have been the subject of consultation under Section 7 of the Endangered Species Act.

6.6 The United States and the Tribes are barred by principles of waiver and/or estoppel from seeking any relief related to culverts covered by routine road maintenance activities under a program substantially similar to that of the Oregon Department of Transportation.

6.7 The United States and the Tribes are barred by principles of waiver and/or estoppel from seeking any relief related to culverts that conform to the design standards of the Washington Department of Fish and Wildlife in existence as of March 3, 1999.

6.8 If the Tribes have any cause of action under the treaties with respect to state-owned culverts, it is against the United States for breach of the duty to ensure that the Tribes' treaty rights are not abrogated or impinged upon when federal executive agencies carry out their responsibilities. The Tribes have no cause of action against the State.

6.9 The Court lacks subject matter jurisdiction over some of the claims in the RFD and in the United States' response because there is no case or controversy related to the State's current culvert design, construction, and maintenance standards.

6.10 The Tribes and the United States lack standing to seek relief related to the State's current culvert design, construction, and maintenance standards.

6.11 The law of the case doctrine bars the claims in the RFD and in the United States' response.

6.12 The Equal Footing Doctrine bars the claims in the RFD and in the United States' response.

6.13 The political question doctrine bars the claims in the RFD and in the United States' response.

6.14 The claims are non-justiciable because the treaties are not self-executing with respect to the rights alleged in the RFD and the United States' response.

6.15 Any State obligation to the Tribes or the United States is satisfied by compliance with the federal Endangered Species Act and other federal statutes and regulations.

6.16 The Tribes and the United States are not entitled to retroactive remedial equitable relief that is appropriate only for constitutional violations.

6.17 The relief that the Tribes and the United States demand is unconstitutional under the provisions of the United States Constitution, including Article IV, Section 4.

6.18 The requested relief would require federal court intrusion into legislative decisions reserved to the State under principles of federalism, state sovereignty and the 10th Amendment to the United States Constitution.

6.19 The claims in the RFD are barred by the 11th Amendment to the United States Constitution.

6.20 The RFD and the United States' response fail to state a claim upon which relief can be granted.

VII. CROSS-REQUEST FOR DETERMINATION AGAINST THE UNITED STATES AND COUNTER-REQUEST FOR DETERMINATION AGAINST THE TRIBES

The State avers as follows:

7.1 This Court has jurisdiction over the State's Cross- and Counter-Requests For Determination under 28 U.S.C. § 1331 and the Court's June 22, 1993 Order Dismissing Without Prejudice Phase II and Certain Subproceedings in Phase I.

7.2 If the actions of the State of Washington that are the subject of the RFD violate any treaty-based duty owed the Tribes, the executive branch of the United States government has violated its duty to ensure that the Tribes' treaty rights are not abrogated or impinged upon by funding, authorizing, approving, or otherwise participating in the state actions that are the subject of the RFD.

7.3 If the treaties include a duty to protect fish habitat independent of laws passed by Congress, the United States has violated its duty to the Tribes

in failing to protect fish habitat on federally-owned lands.

7.4 If the treaties include a duty to protect fish habitat independent of laws passed by Congress, the plaintiff United States has unlawfully injured the State of Washington by, among other things, placing on the State a disproportionate burden to meet any such treaty-based duty.

7.5 If the treaties include a duty to protect fish habitat independent of laws passed by Congress, the United States has managed its lands in such a way as to create a nuisance that unfairly burdens the State of Washington.

7.6 If the treaties include a duty to protect fish habitat independent of laws passed by Congress, the Tribes have violated their duty to the State by failing to inventory and correct their own road-related fish passage barriers.

VIII. STATE'S DEMAND FOR JUDGMENT

WHEREFORE, the defendant State of Washington requests the following relief:

8.1 A judgment that the RFD and the United States' Response be dismissed and that the Tribes and the United States take nothing.

DECLARATORY JUDGMENT

8.2 A declaration that there is no treaty-based right or duty of fish habitat protection as described in the Tribes' RFD and in the United States' "Response."

8.3 In the alternative, should the Court conclude that the actions of the State of Washington

that are the subject of the RFD violate any treaty-based duty owed the Tribes, a declaration that the executive branch of the United States government has violated its duty to ensure that the Tribes' treaty rights are not abrogated or impinged upon by funding, authorizing, approving, or otherwise participating in the state actions that are the subject of the RFD.

8.4 In the alternative, should the Court recognize the existence of a treaty-based duty of fish habitat protection owed by the State of Washington, a declaration that the correlative duty runs to the Tribes and the United States as well.

8.5 In the alternative, should the Court recognize the existence of a treaty-based right or duty of fish habitat protection, a declaration that the United States has violated the duty owed the plaintiff Tribes.

8.6 In the alternative, should the Court recognize the existence of a treaty-based right or duty of fish habitat protection, a declaration that the United States has placed on the State a disproportionate burden of meeting any such treaty-based duty.

8.7 In the alternative, should the Court recognize the existence of a treaty-based right or duty of fish habitat protection, a declaration that the United States has managed its lands in such a way as to create a nuisance that unfairly burdens the State of Washington.

8.8 In the alternative, should the Court recognize the existence of a treaty-based right or duty

of fish habitat protection, a declaration that the plaintiff Tribes have violated the duty owed the State.

PROHIBITORY INJUNCTION

8.9 In the alternative, should the Court recognize the existence of a treaty-based right or duty of fish habitat protection, an order prohibiting the Tribes and the United States from constructing and maintaining any culverts that reduce the number of fish that would otherwise return to or pass through the usual and accustomed grounds and stations of any plaintiff Tribe.

MANDATORY INJUNCTION

Also in the alternative, should the Court recognize the existence of a treaty-based right or duty of fish habitat protection, the State requests that the Court enter Orders that:

8.10 Require the United States and each of its agencies, departments, officers, and agents to identify the location of all culverts constructed, maintained, or managed by the United States government or any of its agencies and departments including but not limited to the United States Forest Service, the United States Bureau of Indian Affairs, the United States Bureau of Land Management, the United States Fish and Wildlife Service, the National Park Service, and the United States military departments that diminish the number of fish that would otherwise return to or pass through any plaintiff Tribe's usual and accustomed fishing grounds and stations, before the State of Washington is required to conduct any such identification of state-owned culverts.

8.11 Require the United States and each of its agencies, departments, officers, and agents to fix and thereafter maintain all culverts built or maintained by any Federal agency or department, such that they do not diminish the number of fish that would otherwise return to or pass through the usual and accustomed fishing grounds and stations of the plaintiff Tribes, before the State of Washington is required to repair or remove any of its culverts.

8.12 Require each of the plaintiff Tribes to identify the location of all culverts constructed, maintained, or managed by that Tribe that diminish the number of fish that would otherwise return to or pass through any plaintiff Tribe's usual and accustomed fishing grounds and stations, on the same schedule applied to the State of Washington.

8.13 Require each of the plaintiff Tribes to fix and thereafter maintain all culverts built or maintained by that Tribe, such that they do not diminish the number of fish that would otherwise return to or pass through the usual and accustomed fishing grounds and stations of the plaintiff Tribes on the same schedule applied by the Court to the State of Washington.

OTHER RELIEF

8.14 The State of Washington further requests that the Court award the State its actual costs of litigation including reasonable attorneys' fees.

8.15 The State of Washington further requests all other relief the Court deems just and equitable.

Dated this *15th* day of March, 2001.

CHRISTINE O. GREGOIRE
Attorney General of Washington

s/Robert K. Costello
ROBERT K. COSTELLO, WSBA #12920
Senior Assistant Attorney General

The Honorable Ricardo S. Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, Plaintiffs, v. STATE OF WASHINGTON, Defendant.	NO. C70-9213 Subproceeding No. 01-1 (Culverts) WASHINGTON'S REPLY IN SUPPORT OF MOTION FOR LEAVE TO SET UP COUNTERCLAIM BY AMENDMENT

I. ARGUMENT

A. Washington has Identified "Agency Action Unlawfully Withheld" Within the Waiver of Sovereign Immunity in the Administrative Procedure Act.

This case is not like *Norton v. Southern Utah Wilderness Alliance*, 124 S. Ct. 2373 (2004) ("*SUWA*"). Paragraphs 5.36, 5.43, 5.47, and 5.52 of Washington's proposed amended answer identify discrete agency actions—the Federal Agency Plaintiffs' failure to provide fish passage through specific culverts. The locations of some of these culverts are precisely known. *See* Wagner Decl. Ex. 2. The Federal Agency Plaintiffs' failure to fix these culverts is a discrete "failure to act" under 5 U.S.C. § 551(13). *SUWA*, 124 S. Ct. at 2379. It is an "agency action" under 5 U.S.C. § 702. See 5 U.S.C. §§ 551(13), 701(2); 706(1).

The United States' declarations show that the Forest Service alone has well over 200 fish-blocking culverts within the *United States v. Washington* case area. The United States *[caption page only]*

The Honorable Ricardo S. Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

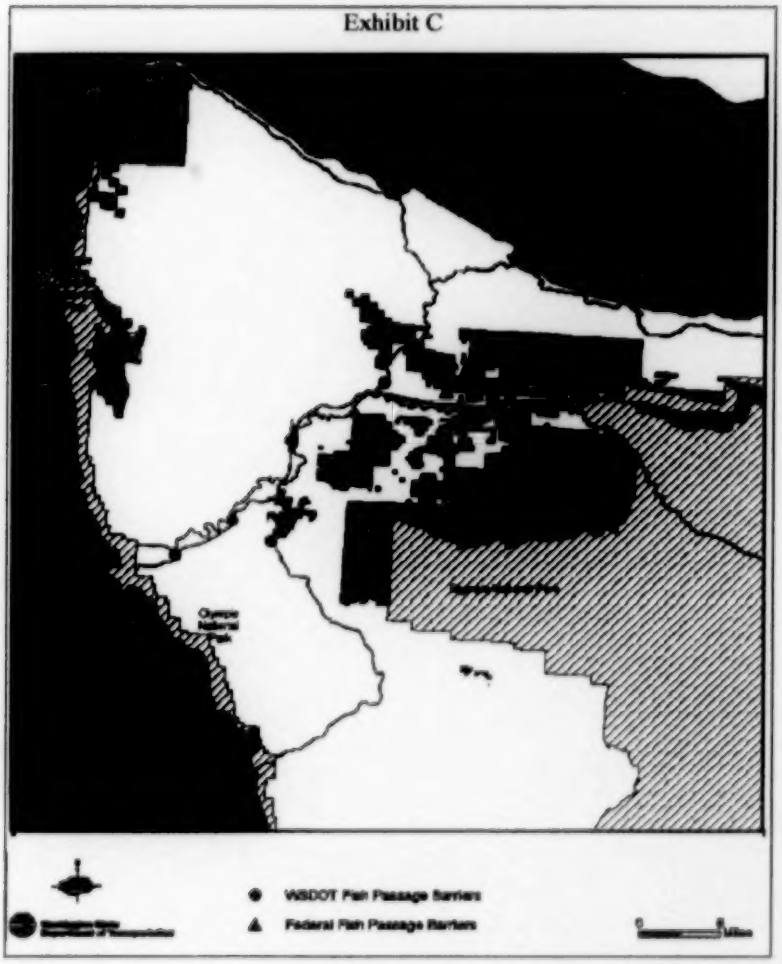
UNITED STATES OF AMERICA, et al., Plaintiff, v. STATE OF WASHINGTON, Defendant.	NO. C70-9213M Subproceeding No. 01-1 (CULVERTS) DECLARATION OF PAUL J. WAGNER IN SUPPORT OF WASHINGTON'S REPLY IN SUPPORT OF MOTION FOR LEAVE TO SET UP COUNTERCLAIM BY AMENDMENT

I, Paul J. Wagner, declare as follows:

1. I am the Biology Branch Manager for the Environmental Services Office of the Washington State Department of Transportation ("WSDOT"). I have held this position for 11 years and I have worked for the WSDOT as a biologist for a total of 15 years. My duties include management of the WSDOT's Fish Passage Barrier Removal Program. I have a BS degree in natural history from Juniata College. The statements in this declaration are based on my personal knowledge and upon my review of official agency records.

2. One of the problems facing salmon and trout populations is an inability to migrate into usable stream habitat for rearing and spawning because of barrier culverts at stream crossings. Many roads in the State of Washington use culverts to span streams and *[caption page only]*

Exhibit C


WSDOT Fish Passage Barriers
Federal Fish Passage Barriers

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THE HONORABLE RICARDO MARTINEZ

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiff, v. STATE OF WASHIGNTON, Defendant.	No. C70-9213M Subproceeding No. 01-1 (Culverts) DECLARATION OF MATTHEW J. WITECKI IN SUPPORT OF WASHINGTON'S MOTION FOR SUMMARY JUDGMENT

I, Matthew J. Witecki, declare as follows:

1. I am the Chief Hydraulic Engineer and Branch Manager of the Hydraulic Engineering Office for the Washington State Department of Transportation ("WSDOT"). I have held this position or its equivalent for 15 years and I have worked for the WSDOT as a hydraulic engineer for a total of 30 years. In all, I have worked for WSDOT since 1971. My duties include supervising the publication of the WSDOT Highway Run-off Manual and the WSDOT Hydraulics Manual, which prescribe design standards for hydraulic and drainage design work on WSDOT facilities. My other duties include assisting WSDOT bridge design office with the design of in-water bridge structures, and assisting other designers with highway drainage and water quality design issues. I was the principal author of the WSDOT

Hydraulics Manual (1989. Ed.). This manual establishes the design standards for all WSDOT drainage and hydraulic work. I have taught numerous training classes for designers and spoken at many conferences on hydraulic design. I have a BS degree in civil engineering from St. Martin's College (now University). Since then I have completed intensive training courses in statistics and hydrology for engineers sponsored by the Federal Highway Administration ("FHWA") as well as numerous continuing education classes in hydraulics, hydrology and related topics. The statements in this declaration are based on my personal knowledge.

2. Until the Washington Department of Fish and Wildlife ("WDFW") developed new culvert design guidelines specifically intended to accommodate fish passage, WSDOT's culvert design standards were based upon FHWA guidance. Specifically, WSDOT relied upon an FHWA publication entitled Hydraulic Engineering Circular #10 ("HEC #10"). The FHWA has issued many publications such as HEC #10 as guidance for state and local highway and road departments. The earliest version of HEC #10 in our library is dated March, 1965. The FHWA has updated the circular many times but the substance of the sizing procedures has remained virtually unchanged over the years. WSDOT has used the procedures identified in the then-current version of HEC #10 as the basis for Chapter Three of the WSDOT Hydraulic Manual, which relates to the use of hydraulic criteria for sizing culverts. The WSDOT manual contains the same culvert sizing charts and nomographs originally set forth in HEC #10.

3. During the course of my career, I have reviewed the hydraulic design manuals used by several other state highway agencies. All of those manuals used HEC #10 as the basis for culvert sizing protocols. I know that concrete, plastic, and corrugated metal pipe manufacturers all recognize, accept, and support the protocols contained in HEC #10 for the design of road culverts. The protocols and techniques set forth in HEC #10 are generally accepted as the industry standard for the design of road culverts.

4. In the early 1990's, WDFW notified WSDOT that in some circumstances, culverts designed according to the guidelines in HEC #10 failed to provide for adequate fish passage. A number of interagency meetings took place and ultimately WSDOT found the WDFW's position compelling and adopted the WDFW fish passage culvert design standards. We modified the Hydraulic Manual and our training to reflect the WDFW's fish-friendly design methods.

5. Virtually all of the WSDOT culverts identified as barriers to fish passage were designed according to the FHWA design standards promulgated in HEC #10. At no time did FHWA notify WSDOT that the federal design standards failed to provide fish passage or that culverts designed pursuant to the standards might violate treaty fishing rights. Although I understand that it is considering revisions to its culvert design standards, the FWHA has not officially modified HEC #10 to better provide for fish passage. Because the methods set forth in HEC #10 were considered the industry design standard, WSDOT would have adopted any fish

passage-related design improvements identified by the FHWA.

I declare under penalty of perjury that the foregoing is true and correct.

DATED this *4* day of August, 2006.

s/Matthew J. Witecki
MATTHEW J. WITECKI

The Honorable Ricardo S. Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, Defendant.	NO. C70-9213 Subproceeding 01-1 (Culverts) DECLARATION OF MARY E. JONES RE: WASHINGTON'S MOTION FOR SUMMARY JUDGMENT

I, MARY E. JONES, declare as follows:

1. I am a Paralegal with the Washington State Attorney General's Office, assigned to the Fish, Wildlife and Parks Division. As part of my duties, I am assigned to assist the attorneys handling the above litigation.

2. The State's Motion for Summary Judgment contains numerous footnotes referring to discovery in this matter. Due to the complexity of this case and the number of parties involved, tribal discovery answers were produced over the course of five years in response to three sets of discovery. Additionally, depositions were taken of 12 tribal witnesses.

3. To assist the court in finding discovery pages referred to in the footnotes, attached hereto (Attachment 1) is a footnote/discovery cross-reference table together with a seriatim numbered record containing true and correct copies of all discovery referenced in the footnotes.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this *9th* day of *August*, 2006.

s/Mary E. Jones
MARY E. JONES

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[Page 001]

HONORABLE JUDGE
BARBARA JACOBS ROTHSTEIN

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiff, v. STATE OF WASHINGTON, et al., Defendants.	Civil No. C70-9213 Sub-Proceeding No. 01-01 (Culverts) PLAINTIFF-INTERVENOR TRIBES' ANSWERS AND RESPONSES TO WASHINGTON'S FIRST DISCOVERY REQUESTS

* * * * *

[Page 0017]

INTERROGATORY NO. 40: Please identify the quantity of fish that you contend would enable each Tribe to achieve a moderate living from treaty fisheries.

ANSWER: The Tribes make no contention as to the quantity of fish that would enable each Tribe to achieve a moderate living from its fisheries. This Court has held that, as of 1994, the Tribes were not making a moderate living. The Tribes are aware of no facts which would suggest a different conclusion today. Given that the Tribes are not now making a moderate living, it is not necessary to speculate as to

what a moderate living might be at some future date with unknown conditions. Furthermore, such

[Page 0018]

speculation would not lead to the discovery of admissible evidence.

* * * * *

INTERROGATORY NO. 43: With respect to each Tribe how many fish are required to provide a moderate living?

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ANSWER: Unknown.

INTERROGATORY NO. 44: With respect to each Tribe, when was the last time that the Tribe obtained a moderate living from fishing?

ANSWER: Unknown.

INTERROGATORY NO. 45: Please describe in detail how the State can determine whether any Tribe has achieved a moderate living from the fishery.

ANSWER: See Answer to Interrogatory No. 40.

INTERROGATORY NO. 46: Please describe in detail how the State can determine whether a Tribe's inability to achieve a moderate living from the fishery is attributable to State-owned fish passage barrier culverts or to some other cause.

ANSWER: Because the Tribes are not achieving a moderate living from their fishing, any diminution of harvestable fish attributable to State owned culverts contributes to the Tribes' inability to earn a moderate living.

* * * * *

[Page 0020]

ANSWERS AND RESPONSES dated this 7th day of September, 2001.

RAAS, JOHNSEN & STUEN, P.S. OFFICE OF SPECIAL COUNSEL

s/Daniel A. Raas

DANIEL A. RAAS, WSBA #4970
Counsel for the Lummi Indian Tribe
Tribal Coordinating Counsel

KANJI & KATZEN, PLLC

s/Phillip E. Katzen by DAR

PHILLIP E. KATZEN, WSBA #7835
Co-Counsel for the Suquamish, Jamestown, Lower Elwha, Pt. Gamble Bands of S'Klallams, Nisqually, Nooksack, Sauk-Suiattle, Skokomish, Squaxin Island, Stillagaumish, and Upper Skagit Tribes
Tribal Coordinating Counsel

MORISSET SCHLOSSER AYER et al.

s/Mason D. Morisset by DAR

MASON D. MORISSET, WSBA #273
Counsel for the Tulalip Tribe
Tribal Coordinating Counsel

* * * * *

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HONORABLE RICARDO S. MARTINEZ

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiff, v. STATE OF WASHINGTON, et al., Defendants.	Civil No. C70-9213 Sub-Proceeding No. 01-01 (Culverts) PLAINTIFF-INTERVENOR TRIBES' ANSWERS AND RESPONSES TO WASHINGTON'S THIRD DISCOVERY REQUESTS

* * * * *

[Page 0052]

INTERROGATORY NO. 70: Do you contend that the Stevens Treaties reserve a fish passage easement or servitude in the lands that the Tribes ceded in Article I of each of the Stevens Treaties?

ANSWER: Objection. Interrogatory is vague and ambiguous. The term "fish passage easement or servitude" is not defined. Also, the scope of the easement or servitude that is the subject of this Interrogatory is unknown so that it cannot be answered without assumptions and speculation as to the State's meaning. In addition, the usual and

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accustomed fishing grounds and stations of the Tribes are neither limited nor circumscribed nor even meaningful in reference to the lands ceded by the Tribes in the Stevens Treaties.

Notwithstanding these objections, the Tribes contend that the Stevens Treaties secure to them the "right of taking fish" which imposes a duty upon the State to refrain from diminishing the number of fish that would otherwise return to or pass through the tribe's usual and accustomed fishing grounds and stations by, among other things, blocking fish passage to the extent that such diminishment would impair the tribes' ability to earn a moderate living from the fishery. This could be characterized as a negative easement or negative servitude.

* * * * *

[Page 0063]

INTERROGATORY NO. 98: If the court grants all the relief you request in your Request For Determination, will the Tribes be able to earn a moderate living from the fishery?

ANSWER: Objection. Interrogatory requires speculation and assumption on a variety of issues, including the impacts of the granted relief over an extended time and the effectiveness of other current and future restoration and conservation efforts.

Notwithstanding these objections, as ¶ 4.1 of our Request For Determination implies, correcting the many state-owned culverts that diminish the number of fish that would otherwise return to or pass through the tribe's usual and accustomed fishing

grounds and stations would enhance the ability of the Tribes to earn a moderate living from their fisheries.

* * * * *

INTERROGATORY NO. 100: Have the Tribes collectively or any individual Tribe or Tribes ever earned a moderate living from the fishery?

ANSWER: We do not have enough information to answer this Interrogatory.

* * * * *

[Page 0084]

ANSWERS AND RESPONSES dated this 27th day of May, 2005.

RAAS, JOHNSEN & STUEN, P.S. OFFICE OF SPECIAL COUNSEL

DANIEL A. RAAS, WSBA #4970
Counsel for the Lummi Indian Tribe
Tribal Coordinating Counsel

KANJI & KATZEN, PLLC

PHILLIP E. KATZEN, WSBA #7835
Co-Counsel for the Suquamish, Jamestown, Lower Elwha, Pt. Gamble Bands of S'Klallams, Nisqually, Nooksack, Sauk-Suiattle, Skokomish, Squaxin Island, Stillagaumish, and Upper Skagit Tribes
Tribal Coordinating Counsel

MORISSET SCHLOSSER AYER et al.

MASON D. MORISSET, WSBA #273
Counsel for the Tulalip Tribe
Tribal Coordinating Counsel

* * * * *

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The Honorable
Barbara Jacobs Rothstein

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, et al., Defendants.	CIVIL NO. C70-9213 Sub-Proceeding No. 01-1 (Culverts) WASHINGTON's FIRST DISCOVERY REQUESTS TO PLAINTIFF UNITED STATES AND RESPONSE THERETO TOGETHER WITH INITIAL DISCLOSURES

* * * * *

[Original page 5]

INTERROGATORY NO. 28: If the answer to Interrogatory No. 26 is yes, please particularly identify all facts that support your contention that the State of Washington has violated the duty to refrain from diminishing the number of fish that would otherwise return to or pass through the Tribes' usual and accustomed fishing grounds and stations.

ANSWER: Not applicable. See response to Interrogatory No. 26 which does not call for a "yes or no" answer. Furthermore, we object on the basis that you mis-characterize the United States' contention.

INTERROGATORY NO. 29: Do you contend that the Stevens Treaties impose a duty upon private

parties to refrain from diminishing the number of fish that would otherwise return to or pass through the Tribe's usual and accustomed fishing grounds and stations to the extent that such diminishment would impair the Tribes' ability to earn a moderate living from the fishery?

ANSWER: Objection. Neither the Tribes nor the United States in this sub-proceeding have made any claims against private parties, and thus an answer to this Interrogatory would not lead to the discovery of relevant evidence. Furthermore, to the extent this interrogatory seeks the legal research or analysis of counsel, it is objectionable under the work product doctrine.

INTERROGATORY NO. 30: Do you contend that the Stevens Treaties impose a duty upon the State of Washington to refrain from diminishing the number of fish that would otherwise return to or pass through the Tribes' usual and accustomed fishing grounds and stations, if such diminishment did not impair the Tribes' ability to earn a moderate living from the fishery?

ANSWER: No.

INTERROGATORY NO. 31: Do you contend that a Tribe has a right to relief from all State or State-authorized environmental degradation of fish habitat that interferes with a Tribe's ability to achieve a moderate living from the fishery?

ANSWER: No. The United States' contentions in this sub-proceeding are set forth in the United States' Response to Request for Determination, and relate

solely to state-owned

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culverts. Other "State or State-authorized environmental degradation of habitat that interferes with a Tribe's ability to achieve a moderate living from the fishery" is not at issue, and as the Court of Appeals has instructed, such State conduct and any State obligation or tribal rights to relief would depend for their precise legal formulation on all of the facts presented by a particular dispute. Moreover, an Indian tribe may have "a right to relief" under any other applicable law in addition to the treaty rights at issue here.

INTERROGATORY NO. 32: For each Tribe, please particularly identify all actions that the Tribe has taken to preserve and enhance the fishery occurring within that Tribe's tribal land.

ANSWER: Objection. This interrogatory it is overbroad, vague, ambiguous, unduly burdensome, oppressive and not calculated to lead to admissible evidence. Without waiving the foregoing objection, the United States notes that each Tribe engages in continuing actions to preserve and enhance its fisheries, including participation in management activities pursuant to the Magnuson Fisheries Management Act, participation in annual management planning with other tribes and the State of Washington, participation in hatchery and rearing operations, participation in habitat improvement and protection activities, participation in water quality and water permitting activities and numerous other actions all designed to preserve and enhance fisheries

and habitat in general throughout the case area as well as in its tribal lands.

See also documents produced in response to Request for Production No. 8.

INTERROGATORY NO. 33: Do you contend that prior to the execution of the Stevens Treaties, the Tribes had developed systems and institutional arrangements for the allocation and protection of fish resources within lands and waters used by the Tribes?

ANSWER: Yes.

REQUEST FOR PRODUCTION NO. 30: If the answer to Interrogatory 33 is yes, please produce for inspection and copying all documents supporting your contention that before the

[Original page 7]

Stevens Treaties were executed, the Tribes developed systems and institutional arrangements for allocation and protection of fish resources within lands and waters used by the Tribes.

RESPONSE: In part these documents are the subject of expert witness testimony and will be produced in due course. In part these documents are referenced in Exhibits USA-20-30 and USA 53, and in the record and documents supporting FF 3 and 6, 384 F. Supp. at 350-1. see also FPTO §3-33.

INTERROGATORY NO. 34: If the answer to the preceding interrogatory is yes, please identify all facts supporting your contention.

ANSWER: In part these facts are the subject of expert witness testimony and will be stated in due course. In part these facts are referenced in Exhibits USA-20-30

and USA 53, [and others] and in the record and in the other documents supporting FF 3 and 6. see also FPTO §3-33.

INTERROGATORY NO. 35: (a) Do you contend that the Stevens Treaties secure to the Tribes a right to be supplied with sufficient fish so as to enable the Tribes to achieve a moderate living from treaty fisheries? (b) Do you contend that the Treaties secure to the Tribes a right to be supplied with sufficient fish to satisfy the Tribes' present and future needs for a subsistence and livelihood?

ANSWER: Objection. The phrase "to be supplied with" is ambiguous and could be read to equate treaty rights with a government entitlement or a "supply of fish." Without waiving the objection, the United States makes neither contention. The United States' contentions in this sub-proceeding are set forth in the United States' Response to Request for Determination, and relate solely to state-owned culverts. Furthermore, the United States does not contend that the Treaties by themselves reserve to the tribes a right "to be supplied with sufficient fish * * *." See United States Opposition to Washington's Motion for Judgment on the Pleadings re: Law of the Case, at 2-3 (filed July 26, 2001). The supply of fish available to treaty fishers is subject to natural fluctuations in abundance. Other laws or agreements may require other things,

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including compensation or mitigation for fishery losses resulting from habitat destruction, overfishing or other human caused factors.

INTERROGATORY NO. 36: If your answer to either part of the preceding interrogatory is yes, please identify all facts supporting your contention that the treaties secure to the Tribes a right to be supplied with sufficient fish so as to enable the Tribes to achieve a moderate living from treaty fisheries or to satisfy the Tribes' present and future needs for a subsistence and livelihood.

ANSWER: Not applicable. See Response to Interrogatory No. 35.

REQUEST FOR PRODUCTION NO. 31: If your answer to either part of Interrogatory No. 35 is yes, please produce for inspection and copying all documents supporting your contention that the treaties secure to the Tribes a right to be supplied with sufficient fish so as to enable the Tribes to achieve a moderate living from treaty fisheries or to satisfy the Tribes' present and future needs for a subsistence and livelihood.

RESPONSE: Not applicable. See Response to Interrogatory No. 35.

INTERROGATORY NO. 37: Please identify all facts supporting the contention at ¶3.13 of the Tribes' Request for Determination that the "[s]uch a reduction in the number of fish available to the plaintiff Tribes impairs the Tribes' ability to achieve a moderate living from their treaty fisheries" or that formed the basis for your decision to "admit" that contention in ¶3.13 of the United States' Response.

ANSWER: The United States is aware of no facts which would support a denial of the contention in ¶3.13. It logically follows, moreover, that if the

quantity of fish available for harvest by the Tribes declines, the tribes' ability to earn a moderate living from fishing would likewise decline. As this Court has held as a matter of fact in Sub-proceeding 89-3, the Tribes are not now able to obtain a moderate living from their fisheries; the reduction in available fish caused by state owned culverts that diminish fish runs thus impairs the Tribes' ability to

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achieve a moderate living from their fisheries.

REQUEST FOR PRODUCTION NO. 32: Please produce for inspection and copying all documents supporting the contention at ¶3.13 of the Tribes' Request for Determination that "[s]uch a reduction in the number offish available to the plaintiff Tribes impairs the Tribes' ability to achieve a moderate living from their treaty fisheries" or that formed the basis for your decision to "admit" that contention in ¶3.13 of the United States' Response.

RESPONSE: The United States admitted the contention because this Court has ruled that the Tribes are not now making a moderate living from their treaty fisheries and it follows that reductions in the number of fish available for harvest would impair the Tribes ability to do so.

INTERROGATORY NO. 38: Please identify the quantity of fish that you contend would enable each Tribe to achieve a moderate living from treaty fisheries.

ANSWER: The U.S. makes no contention as to the quantity of fish that would enable each Tribe to achieve a moderate living from treaty fisheries. This

Court has held that, as of 1994, the plaintiff-Tribes were not making a moderate living. We are aware of no facts which would suggest a different conclusion today. Given that the Tribes are not now making a moderate living, it is neither necessary nor possible to speculate as to what a moderate living might be at some future date with unknown conditions. Furthermore, because such speculation would not lead to the discovery of admissible evidence, the United States objects to this interrogatory.

REQUEST FOR PRODUCTION NO. 33: Please produce for inspection and copying all documents supporting your contention that the quantity of fish identified in your answer to Interrogatory 38 would enable each Tribe to achieve a moderate living from treaty fisheries.

RESPONSE: Not applicable.

INTERROGATORY NO. 39: With respect to the allegation in ¶3.14 of the Tribes' Request for Determination, please identify all facts supporting your contention that the Tribes are not able to achieve a moderate living from their treaty fisheries or your decision to admit that . . .

* * * * *

[Page 00106]

INTERROGATORY NO. 42: With respect to each Tribe, when was the last time that the Tribe obtained a moderate living from fishing?

ANSWER: Unknown.

* * * * *

[Page 00107]

INTERROGATORY NO. 82: Please describe what the Federal Highway Administration has done to ensure that the Tribes' treaty rights were not abrogated or impinged upon when it has set or approved design standards for federal-aid highways within the case area.

ANSWER: The FHWA Washington Division Office responds as follows:

Many factors are considered in setting design standards. We have not specifically looked at treaty rights, but the standards are intended to provide the maximum safety, efficiency, and durability for all users. Generally states that receive Federal aid monies must comply with the standards in the AASHTO Green Book on Federal-aid projects. However, FHWA has approved WSDOT's Design Manual to be used in lieu of the AASHTO Green Book.

Standards used for the design of roadway and roadside features, including drainage culverts, are contained in several State manuals (Design Manual, Roadside Design Manual, Highway Runoff Manual, Hydraulic Manual, Local Agency Guidelines, etc.). The FHWA approves all of these manuals and, therefore the design standards used by the State and local agencies for Federal-aid highway projects. When new standards are proposed, the FHWA uses standards developed by American Association of State Highway and Transportation Officials and others, best practices guides, etc., for determining the acceptability of new standards.

* * * * *

[Page 00110]

INTERROGATORY NO. 105: Please describe in detail how the State can determine whether a Tribe's inability to achieve a moderate living from the fishery is attributable to the State-owned fish passage barrier culverts or some other cause.

ANSWER: If the Tribes are not achieving a moderate living from their fishing, any diminishment of harvestable fish which is attributable to state-owned fish passage barrier culverts contributes to the Tribes' inability to earn a moderate living.

* * * * *

[Page 00121]

DATED this *7th* day of September, 2001.

s/Peter C. Monson
Peter C. Monson
U.S. Department of Justice
Environment & Natural
Resources Div.
Indian Resources Section
999 18th Street, Suite 945
Denver, CO 80202

[Page 00122]

The Honorable
Barbara Jacobs Rothstein

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, et al., Defendants.	CIVIL NO. C70-9213 Sub-Proceeding No. 01-1 (Culverts) WASHINGTON's FIRST REQUESTS FOR ADMISSION TO PLAINTIFF UNITED STATES AND RESPONSE THERETO

* * * * *

[Page 00124]

REQUEST FOR ADMISSION NO. 2: Please admit that the reduction in productive fish habitat caused by culverts owned or controlled by federal agencies has diminished the amount of fish that would otherwise return or pass through the Tribes' usual and accustomed fishing grounds and stations.

RESPONSE:

Deny. The United States does not agree with the assumptions implicit in this request. There are many causes for reductions in the amount of fish that would return to or pass through tribal fishing grounds, including but not limited to state and private culverts, habitat degradation, dams, harvest, water quality, ocean conditions, and disease. Some culverts owned or controlled by federal agencies may be one cause in reduced quantities of fish produced from a particular stream, but information that such federal culverts are the cause of reduced fish runs is inconclusive and it is impossible to generalize. Moreover, after reasonable inquiry and evaluation, the United States lacks sufficient information to determine the quantity or quality of impact of

federally owned or controlled culverts on fish passage in the case area, and therefore cannot determine "the amount of fish" impacted.

* * * * *

[Page 00125]

DATED this *15th* day of March, 2002.

s/Peter C. Monson
Peter C. Monson
U.S. Department of Justice
Environment & Natural Resources Div.
Indian Resources Section
999 18th Street, Suite 945
Denver, CO 80202

* * * * *

[Page 00132]

The Honorable Ricardo S. Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, et al., Defendants.	CIVIL NO. C70-9213 Sub-Proceeding No. 01-1 (Culverts) WASHINGTON'S THIRD DISCOVERY REQUESTS TO PLAINTIFF UNITED STATES AND RESPONSE THERETO TOGETHER WITH INITIAL DISCLOSURES

* * * * *

[Page 00135]

INTERROGATORY NO. 173: Have the Tribes or any individual Tribe or Tribes ever earned a moderate living from the fishery?

ANSWER: The United States does not have sufficient data from which to formulate a definitive response, but understand that the Tribes take the position that the answer is in the affirmative.

INTERROGATORY NO. 174: If your answer to Interrogatory No. 173 is yes, please identify the Tribe or Tribes and the approximate year or years during which the Tribe or Tribes earned a moderate living from the fishery.

ANSWER: The plaintiff Tribes contend that they frequently earned a moderate living from their fisheries until the mid to late 19th Century.

[Page 00139]

Dated this 26*th* day of May 2005.

s/Peter C. Monson
Peter C. Monson
United States Department
of Justice
Environment and Natural
Resources Div.
Indian Resources Section
999 18th Street, Suite 945
Denver, CO 80202

THE HONORABLE RICARDO S. MARTINEZ

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, vs. STATE OF WASHINGTON, et al., Defendants.	Case No.: C70-9213 Subproceeding No. 01-1 (Culverts) DECLARATION OF RICHARD WHITE IN SUPPORT OF PLAINTIFF-TRIBES' MOTION FOR SUMMARY JUDGMENT

I, Richard White, hereby declare as follows:

1. I am currently Margaret Byrne Professor of American History in the History Department of Stanford University. I have a Ph.D in History, awarded in 1975 from the University of Washington, and have been teaching that topic at the university level since 1976.

2. I have published numerous academic papers and books on the history of the American West, including Native American history and issues. My CV is attached to this declaration.

3. I have been previously certified as an expert witness in U.S. v. Washington Subproceeding No. 89-3 (Shellfish).

4. I was asked by counsel for Plaintiff Tribes in this sub-proceeding to investigate the history of the Stevens Treaties including the intentions, expectations and understandings of the negotiators of

the Stevens Treaties, including Isaac Stevens, George Gibbs, other U.S. Commissioners, and the Indian negotiators, regarding both the immediate and future implementation of those agreements and the rights included. I prepared a written report setting forth the results of that investigation. This declaration is a summary of portions of that report.

5. During the winter of 1854 - 1855, Governor Isaac Ingalls Stevens, assisted by George Gibbs, and working under directions received from the federal Commissioner of Indian Affairs, George Manypenny, and his chief clerk, Charles Mix, negotiated three treaties with the Indian villagers living around Puget Sound. He then proceeded over the mountains to negotiate a treaty with inland bands and tribes of whom the current Yakama Nation is a successor. The treaties of Medicine Creek, Point-No-Point, Olympia, Point Elliott, and the treaty with the Makah contained virtually identical language, which would be echoed in the Yakama treaty:

> The right of taking fish at all usual and accustomed grounds and stations, is further secured to said Indians, in common with all citizens of the Territory, and of erecting temporary houses for the purpose of curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses upon open and unclaimed lands; Provided, however, that they shall not take shellfish from any bed staked or cultivated by citizens, and that they shall alter all stallions not intended for breeding horses and shall keep up and confine the latter.

The treaties Stevens negotiated allotted only small land reservations to tribes on the Sound, "a few spots in their domains," and lacked any clause allowing the confinement of the Indians to the reservations. This, and the preservation of fishing rights, reflected the particular realities of life for both Indians and whites on Puget Sound and in greater Washington Territory.

6. The Stevens treaties recognized that by 1854 whites and Indians on Puget Sound had been in steady contact for over twenty years and in sporadic contact for much longer. Indians exchanged fish, furs, and game at Hudson's Bay Company posts, helped build forts, planted and harvested the crops of the Puget Sound Agricultural Company and herded sheep and cattle. Most worked seasonally. Some became plowmen and skilled carpenters and worked the year around. Later, as more American settlers arrived, Indians remained the primary labor force on the Sound. In an 1854 report surveying railroad routes from the Mississippi River to the Pacific Ocean, Gibbs noted that "they provided agricultural labor for the Americans as well as selling them potatoes; they provided them with transportation around the Sound; they carried the mail. And they sold fish and shellfish." The Stevens treaties recognized the interdependence of Indians and whites, on the Sound.

7. Although not all whites hoped that Indians and whites would continue to live and work together in Puget Sound after the adoption of the treaties, the men who gained Stevens' ear recognized the utility of Indians and wanted treaties which would both cede land and leave Indians available to participate in a larger interracial economy. As their meeting notes reveal, the treaty commissioners, including Stevens,

recognized that in negotiating with the Indians they were dealing with a people who:

> have been for a considerable time in contact with the whites, have acquired many of their habits and all their vices. They form a very considerable proportion of the trade of the Sound. Many are good laborers and are employed in families, vessels, lumberyards, mills and on farms. They catch most of our fish, supplying not only our people with clams and oysters but salmon to those who cure and export it.

Writing to Manypenny, Stevens argued for a plan that would create a number of small Indian reservations on the Sound, rather than relocating the tribes to a large reservation east of the Cascades or on the Pacific coast:

> There is a strong sympathy for the Indians among the whites. They are very useful in many ways, for transporting persons about the sound in their canoes, &c. Many of the men, as laborers, are very useful in chopping wood, plowing, driving wagons, &c. Some of the women wash clothes well, and in a variety of ways make themselves useful; and, if confined on reservations, under the direction of efficient agents, I am inclined to think that but little objection, if any, would be made by the whites.

The Stevens treaties sought to perpetuate the early relations between Indians and whites on the Sound.

8. One vital part of the relations that Stevens sought to perpetuate was Indian fishing, both for

subsistence and for trade. Stevens and the other treaty negotiators knew well that Puget Sound Indians relied heavily on their fisheries. Gibbs later observed in his 1877 ethnological monograph, *Tribes of Western Washington and Northwestern Oregon* that: "The principal food of the Indians on the west side of the Cascades may be briefly set down as fish, roots, and berries." Stevens made clear to both the Indians on Puget Sound and the white officials in Washington, D.C., that he planned to preserve this crucial resource. Treaty minutes reveal that Stevens assured the Indians at Point Elliott that the Great Father wished his Indians children "to have homes, pastures for your horses and fishing places." He wished them to learn to farm and to be educated. In return for selling their lands they would "be provided for all these things." At the same time, Stevens argued in his 1854 annual report to Manypenny that "It never could have been the intention of Congress that Indians should be excluded from their ancient fisheries.

9. The Indians themselves expressed the importance of fishing to their way of life, and Stevens and the other negotiators assured them of their continued access to the fisheries. Treaty minutes record that at Point-No-Point, One-lun-teh-tat, an "Old Sko-komish Indian" worried how they were to feed themselves once they ceded so much land to the whites, while Hool-hole-tan-akim also wanted to retain half the land. "Why," he asked, "should we sell all? We may become destitute. Why not let us live together with you?" In the face of such objections, Benjamin F. Shaw, the interpreter, reassured the Indians that they were "not called upon to give up

their old modes of living and places of seeking food, but only to confine their houses to one spot." And Michael Simmons, the special Indian agent for Puget Sound, explained that if they retained a large amount of land they would be confined to it, but that "when a small tract alone was left, the privilege was given of going wherever else they pleased to fish and work for the whites." In negotiations at Neah Bay, the Makah raised questions about the role that the fisheries were to play in their future. Stevens replied that "far from wishing to stop their fisheries, he intended to send them oil, kettles and fishing apparatus." What Stevens and his negotiators explicitly promised in response to Indian objections was access to the usual places for procuring food and continued economic exchange with the whites.

10. Stevens sought, as he described in a letter to Manypenny, to preserve Indian access to fisheries in part to "illustrate, not so much the power as the beneficence and paternal care of the government." Indeed, Manypenny himself argued in his 1854 report to the President that the government was obliged to uphold the treaty provisions. The "duty of the government," he wrote, was "plain." The government had to "fulfil (sic), with the greatest promptness and fidelity, every treaty stipulation with these Indians." As presented by the whites, the treaties required no choosing between fishing and farming, between reservations and education. They were to be part of a single, compatible whole. The Great Father, Stevens told the Indians at Point Elliott, wanted them to be farmers and artisans, he wanted them to be Christian and educate their children, but he "also wants you to take your fish and go back to the mountains and get

berries." Stevens and Gibbs worried that as whites took up claims under the Donation Land Act of 1850, they would drive Indians from their fishing grounds. The men argued that whites whose donation claims encompassed Indian fishing grounds had no right to monopolize them.

11. Stevens also sought to preserve Indian fishing rights to reduce the cost of implementing the treaties. In his instructions to Stevens, Mix had emphasized that whatever the form of the treaties, they should incur minimal expenses for the government. Mix began and ended his instructions on the same note of financial caution. He allowed Stevens to "exercise a sound discretion" in departing from the general instructions, but he was "to leave no question open, out of which difficulties may hereafter arise, or by means of which the Treasury of the United States may be approached." Stevens believed Mix wanted him to reduce the costs of negotiation and of annuity payments as well as to encourage Indian self-sufficiency. As the Treaty Commissioners noted in their meeting of December 26, 1854, "it was necessary to allow them to fish at all accustomed places" because this "was necessary for the Indians to obtain a subsistence." And securing the Indians a subsistence was critical if Stevens was to follow his very clear instructions to keep the cost of the treaty down. By guaranteeing the Indians a right to their share of the bounty of the land, rivers, and Sound, the treaties would enable them to feed themselves at little cost to the government.

12. Stevens also preserved Indian fishing rights to encourage continued Indian participation in the interracial economy of the Sound. By giving Indians

access to the commodities they not only used for subsistence but also sold on local markets, the Indians would remain close enough to white settlements to provide necessary labor and to continue to trade with whites. Stevens argued that the small reserves and the fishing and other rights preserved in Article III would allow "the Indians to catch salmon, gather roots, and berries, pasture their animals on unclaimed land and participate as heretofore in the labor of the Sound." After detailing to Commissioner Manypenny the centrality of Indian peoples to the economy of the Sound, Stevens argued that the provisions of Article III had "strict references" to their actual wants and "to the part they play and *ought to play hereafter* in the labor and prosperity of the territory (emphasis added)."

13. Stevens and the other negotiators believed that the abundant fisheries they had observed in Puget Sound would continue unabated forever. Early white accounts of these fisheries breathlessly reported that they were inexhaustible. J.G. Cooper and G. Suckly *[sic]*, who conducted natural history research in the Pacific Northwest between 1853 and 1857, reported in *The Natural History of Washington Territory* . . . , published in 1859, that "This arm of the sea [Observatory Inlet] was frequented at the time by such myriads of the salmon that a stone could not have reached the bottom without touching several individuals -- their abundance surpassing the efforts of the imagination to conceive." White settlers, like Indians, fed heavily on this abundant resource. Gibbs wrote his mother from Astoria, Oregon to report that salmon were "here in abundance. In fact we get hardly anything else & I don't eat any except particular

cuts." More, the negotiators, and other whites expected that Puget Sound's fisheries would continue to supply not just the subsistence needs of Indians and whites, but an expanding commercial market as well. Gibbs fully expected a commercial fishery to develop, and he gave no indication that settlement or industrial development on Puget Sound or elsewhere in Western Washington would diminish this fishery. It was not until the 1890s that scientists began to caution that salmon and other stocks might not remain abundant forever.

14. Stevens and the other negotiators anticipated that Indians would continue to fish the inexhaustible stocks in the future, just as they had in the past. Stevens specifically assured the Indians that they would have access to their normal food supplies now and in the future. At the Point Elliott Treaty, Stevens began by speaking of subsistence. "[A]s for food, you yourselves now, as in time past, can take care of yourselves." The question, however, was not whether they could now feed themselves, but rather whether in the future after the huge cessions that the treaties proposed the Indians would still be able to feed themselves. Stevens assured them that he intended that the treaty guarantee them that they could. "I want that you shall not have simply food and drink now but that you may have them forever." The negotiators uniformly agreed on the abundance of the fisheries, the dependence of the Indians upon them, their commercial possibilities, and their future "inexhaustibility." Stevens and Gibbs could both foresee and promote the commercial development of the territory, the creation of a commercial fishery by

whites, and the continuation of an Indian fishery, They did not see any contradiction between them.

15. For forty years following the adoption of the treaties, Indians continued to harvest fish for subsistence and trade as they had in years past, and local Indian agents encouraged their efforts. Twelve years after the treaties were negotiated, the Superintendent of Indian Affairs for Washington Territory reported that all the tribes lived by "farming, fishing and the chase." This system proved very durable. A special report by the Board of Indian Commissioners on Western Washington in 1874 predicted that Indians would continue to depend on fishing, logging, and wage labor, and any plan to consolidate the reservations should take this as well as the possibilities for agriculture into account. In 1880, the salmon fishery already formed one-third of the production of the West Coast fisheries, but it was as yet little developed in Puget Sound. "The whole Puget Sound region is very abundantly supplied with fish," the census reported, "but for want of a market the fisheries are little developed and has yet little commercial importance." Although there were now some Chinese, Italian, and Portuguese fishermen on the Sound, Indian peoples were still, twenty-five years after the treaties, the primary fishers on Puget Sound. The fisheries remained abundant. Until Indians were systematically deprived of their fishing rights and the fisheries began to decline in the late nineteenth and early twentieth centuries, the Indians remained self-supporting.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this *10* day of August 2006, at *Redwood City*, California.

s/ Richard White
Richard White

THE HONORABLE RICARDO S. MARTINEZ

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, vs. STATE OF WASHINGTON, et al., Defendants.	Case No.: C70-9213 Subproceeding No. 01-1 (Culverts) DECLARATION OF JOSEPH R. TAYLOR III IN SUPPORT OF PLAINTIFF-TRIBES' MOTION FOR SUMMARY JUDGMENT

I, Joseph E. Taylor III, hereby declare as follows:

1. I am currently Associate Professor & Canada Research Chair in History and Geography at Simon Fraser University. I have a Ph.D in History, awarded in 1996 from the University of Washington, and have been teaching that topic at the university level since 1996.

2. My fields of specialization and experience include history of the North American West, environmental history, United States 19th and 20th century social and cultural history, American colonial history, history of science, and colonial Latin American history. I have published numerous academic papers and books on the history of the American West, including Native American history and issues. My CV is attached to this declaration.

3. I was asked by counsel for Plaintiff Tribes in this sub-proceeding to investigate the status of salmon populations in western Washington as of 1854-1855; describe the size and scope of impacts on those populations from non-Indian development and settlement, if any, as of that time; describe the public perception and understanding of the status of salmon/fish populations in western Washington as of 1854-55; and, describe the 1854-1855 public attitude and expectation regarding the future of western Washington salmon/fish populations in the future given the expectation for increased settlement and development. I prepared a written report setting forth the results of that investigation. This declaration is a summary of portions of that report.

4. During 1854 and 1855, Washington Territorial Governor Isaac I. Stevens negotiated the treaties of Medicine Creek, Point-No-Point, Olympia, Point Elliott and Neah Bay. In 1854-1855, white settlement and its environmental impact on Puget Sound remained modest, and the fisheries appeared to Indians and whites alike to be inexhaustible. Indeed, as white settlers arrived in the Puget Sound region, they consistently noted the size, diversity, and centrality of salmon in Northwest life, and they speculated about how best to develop commercial fisheries in the region. To the settlers, Puget Sound's salmon stocks appeared inexhaustible, if properly cared for. In 1845, Samuel Crockett noted in his journal that the "great quantities of fish found in the pacific [sic] waters are beyond description: the Salmon is the most plentiful and valuable fish taken here though their [sic] are different kinds of other fish that are very good." White settlers imitated the Indians

they encountered, embracing salmon as a crucial food resource and as a source of profit. In 1854-1855, both Indians and non-Indians assumed that salmon would continue to fulfill their subsistence and trade needs in the future.

5. During the period of treaty negotiations, the number of white settlers remained small and their settlements widely-dispersed. In November, 1853, Colonel J.P. Anderson conducted a territorial census and recorded only 3,965 non-Indians living in the case area. There were at that late date still nearly twice as many Indians as non-Indians living in Washington Territory. And, because they were so few and so isolated from one another, by 1854-1855 white settlers on Puget Sound had had little discernable impact on the region's environment. White settlers were anxious to profit from the region's rich fisheries. They were eager, too, to exploit its game, soil, minerals and timber. But by 1854-1855, white industry remained very limited and localized, and its environmental impact was too modest to noticeably degrade salmon habitat and damage salmon fisheries. Trappers had not yet killed enough beavers to impact salmon habitat; farmers had altered only a tiny fraction of the area by 1855, and had had no discernible impact on salmon runs; miners had had only a minimal impact on salmon runs in the study area; loggers were suffering through an industry recession during 1854-1855, and had not yet seriously damaged salmon runs. Although trapping, farming, mining and logging had already altered human settlement patterns and initiated important environmental changes by 1854-1855, none of these activities had yet created perceptible disruptions in Indian economies or in the

health of salmon runs by the period of treaty negotiations.

6. In the years immediately preceding the treaty negotiations, Puget Sound salmon habitat remained healthy. Salmon harvests in 1854-1855 were larger than usual, and white settlers in those years continued to celebrate the abundance of the catch. Settlers like James Swan continued to feed heavily on salmon. Never did white observers worry that the salmon fishery they so revered would ever decline. In late 1853, George Suckley, who was sent to Washington Territory to survey fish resources, wrote his brother John that, "We have, in the Sound, Salmon, Cod, and many other fish, Clams of various kinds, some of which attain the length of a foot or more." In his official report to Congress, *The Natural History of Washington Territory* . . . , published in 1859, he went further:

> Quite abundant as far south as San Francisco, we find these fish [salmon], as we proceed north, increasing in species and in numbers, until, in arriving at the Columbia river, and at the rivers near Vancouver's Island or the streams falling into Puget Sound, they form one of the most striking wonders of the region. There vast numbers of these fish, differing in anatomical peculiarities, species, and color, and changing much with age, sex, and condition, season of the year, or quality of the water, astonish by their number, and confuse with their variety.

While the arrival and activities of white settlers had begun to alter salmon habitats by 1854-1855, these

alterations had had no discernable impact on the size or stability of Pacific salmon populations; at the time of the treaty negotiations, Puget Sound's waters teemed with salmon.

7. During 1854-1855, white settlement had not yet damaged Puget Sound fisheries. During those years, Indians continued to harvest fish for subsistence and trade as they had in the past. Given the slow pace of white settlement and its limited and localized environmental impact, Indians had no reason to believe during the period of treaty negotiations that white settlers would interfere, either directly through their own harvests or indirectly through their environmental impacts, with Indian fisheries in the future. During treaty negotiations, Indians, like whites, assumed that their cherished fisheries would remain robust forever.

8. Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this *11* day of August 2006, at *Seattle*, Washington.

s/Joseph E. Taylor III
Joseph E. Taylor III

THE HONORABLE RICARDO S. MARTINEZ

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, vs. STATE OF WASHINGTON, et al., Defendants.	Case No.: C70-9213 Subproceeding No. 01-1 (Culverts) DECLARATION OF ROBERT THOMAS BOYD IN SUPPORT OF PLAINTIFF-TRIBES' MOTION FOR SUMMARY JUDGMENT

I, Robert Thomas Boyd, hereby declare as follows:

1. I am currently employed as an anthropological consultant and professional writer. I also an adjunct associate professor in the Department of Anthropology at Portland State University. I have a Ph.D in Sociocultural Anthropology from the University of Washington, awarded in 1985.

2. My area of focus is Northwest Coast Native Americans (particularly Oregon and Washington), specializing in medical anthropology, ethnohistory, cultural ecology, culture contact and change, and demographic anthropology. I have published extensively on Native American anthropological issues in the Pacific Northwest and currently have book contracts with both the University of Washington Press and Columbia University Press. My CV is attached to this declaration.

3. I was asked by counsel for Plaintiff Tribes in this sub-proceeding to investigate the practices, if any, of Indian tribes in western Washington, at and before the treaties of 1854-55, intended to protect, preserve or improve the numbers of fish available for their harvest; and, the significance of any such practices in Indian life at that time. I prepared a written report setting forth the result of that investigation. This declaration is a summary of portions of that report.

4. The Puget Sound Indians with whom Isaac I. Stevens negotiated treaties in 1854 and 1855 – descendants of which make up the modern Nooksack, Lummi, Swinomish, Upper Skagit, Sauk-Suiattle, Tulalip, Stillaguamish, Suquamish, Muckleshoot, Puyallup, Nisqually, Squaxin, Skokomish, Port Gamble S'Klallam, Lower Elwha Klallam, Jamestown S'Klallam, Makah, Hoh and Quileute, and Quinault – relied heavily on the region's abundant salmon fisheries. The peculiarities of the salmon life cycle helped shape the structure of the Puget Sound Indian societies that relied upon them. Salmon hatch in freshwater streams and mature at sea. When ready to reproduce, they congregate at the mouths of their natal rivers, then proceed *en masse* upstream to spawn and die. Because migrating salmon do not feed, and therefore cannot be caught using bait, Indians harvested them with tools like weirs; because salmon require clean gravel and cool water to spawn, Indian taboos discouraged disturbing stream beds and muddying waters during runs; because salmon migrating *en masse*, Indian religious ceremonies celebrated the first salmon of the run to encourage other fish to follow. In pre-treaty Puget Sound, the life

of the Indian was intimately connected to that of his most cherished commodity, the salmon.

5. Pre-treaty Puget Sound Indian societies efficiently harvested vast quantities of salmon. Indians took salmon wherever they could, by whatever means possible. At the same time, Indian societies developed effective tools that managed this vital resource and protected it from depletion. Tribal communities carefully regulated fishing activities with weir builders or social rank, for example, determining who could fish, when they could fish, and amounts taken. Tribal myths encouraged Indians to share their catch and refrain from harvesting more than they needed. In the S'Klallam "Stingy Father" tale, for instance, a father who keeps all of his salmon to himself while his family starves is turned to stone. Indian rituals even discouraged keeping food from guests and strangers. Salmon caught in village weirs were shared throughout the Indian community, each member taking a share of the catch.

6. Pre-treaty Indian fishers also mitigated the impact of their efficient fishing technologies on stocks. Although Indian weirs – fences stretched across tributary streams – could easily kill all of the migrating fish that encountered them, Indian management practices prevented it. Indians periodically lifted their weirs to permit migrating fish to move upstream or to clean the weirs. Myths explained why: The Green River myth "North Wind and Storm Wind" relates what happened when Cold Wind "stretched a fish-weir of ice across the Duwamish River. No fish could get up the river past this trap. Further up the valley the people starved. They could get no fish to eat . . . . All the people were

killed." Those who followed Cold Wind's example could expect swift retribution. Other myths warned that upstream Indians might attack greedy downstream neighbors. A Quileute myth told of poisoning them with a salmon made of "snakes, lizards, frogs, toads, waterdogs." Worse, other myths warned that the salmon themselves might take offense if the weirs were not opened. The Skokomish believed that if they failed to open their weirs the salmon would not return the following year. Such regulations of fishing technology helped pre-treaty Indians preserve salmon fisheries.

7. Indian taboos also helped preserve salmon habitat. Before salmon started running, rivers were to be kept clear. No rubbish or food scraps were to be tossed in the river, no canoes were to be bailed out in it. Menstruating women were not to swim in its waters. Such prohibitions sought to ensure that salmon would want to return to their natal streams. If Tribal members adhered to such roles, returning salmon would find clean streams running in clear, cool water – just the conditions they required to spawn. Violating the taboos risked disturbing spawning grounds and turning salmon away in the future. Fewer returning salmon would, of course, reduce Tribal catches.

8. Other pre-treaty Puget Sound Indian rituals honored the salmon, endowing the fish with supernatural qualities. The First Salmon ceremony was widespread among Puget Sound Indians in the pre-treaty period. During the ceremony, a ritualist or his assistants took the first fish and carried it in a special manner to an alter on which it was displayed to the assembled village. The first fish was usually

placed with its head pointing upstream so the rest of the salmon would continue upstream and not turn back to the sea. The first fish was treated as an honored guest of high rank; the ritualist sprinkled it with eagle down or red ochre or other ritual material, and made a formulaic speech of welcome followed by songs or chants appropriate to greet a visiting chief. The fish was cooked by the ritualist or an assistant to the accompaniment of prayers and songs. Then, each person was given a sacramental taste and the bones of the first fish were returned to the water. After the ceremony, villagers might begin to fish for themselves. The Indians of Puget Sound intended that such a ceremony would ensure the continued abundance of the salmon fishery on which they depended, encouraging the salmon to return year after year.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this *11* day of August 2006, at *Portland*, Oregon.

s/Robert Thomas Boyd
Robert Thomas Boyd

The Honorable Ricardo Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et.al. Plaintiff, vs. STATE OF WASHINGTON, Defendant	Case No.: C70-9213 M Subproceeding No. 01-1 (CULVERTS) DECLARATION OF KEITH LUTZ IN SUPPORT OF TRIBES' MOTION FOR SUMMARY JUDGMENT

1. I, Keith Lutz, residing at 7812 Huetter Ct. SW, Olympia WA 98512, DECLARE UNDER PENALTY OF PERJURY:

2. I am over the age of eighteen, a United States citizen, and am competent to testify as to the matters here set forth. I make this affidavit on the basis of my personal knowledge, skill, experience, training, education, and review of the Tribal harvest data. This affidavit is made by me for the purpose explaining how I derived the following tables of information related to Tribal salmon harvests as part of *United States v. Washington*, 01-1 (Culverts).

3. For the past 21 years (1985-Present), I have been a Fisheries Biologist for the Northwest Indian Fisheries Commission working with the Tribes on harvest management issues. During my employment with the NWIFC, I have participated on several joint State/Tribal technical teams including the North Sound Herring Technical Team, Puget Sound Spring

Chinook Technical Team, and serve as a technical advisor to the Tribes during the PFMC meetings that are held coastwide. My education includes a Bachelor of Science (BS) degree in Fisheries from Humboldt State University with a minor in Oceanography, obtained in 1983.

4. Attached hereto and incorporated herein by this reference are Tables 1 through 9 and Figures 1 through 8. For these Treaty Catch Data tables, I accessed and compiled data from the Treaty Fish Ticket (TFT) database that is created and maintained by the Quantitative Services Division at the Northwest Indian Fisheries Commission. Data queries for this data set were generated in May 2006.

5. In general, for some years after the 1974 Boldt decision, Tribal landings steadily increased as they were allocated and were able to harvest a larger portion of the available harvest. The available harvest levels were augmented by State and Tribal hatcheries that went into production to supplement/replace wild fish production lost to degraded habitat. In more recent years, the available harvest levels have declined substantially due to various causes including, but not limited to, the loss of production (natural and hatchery), habitat degradation, and poor ocean survival.

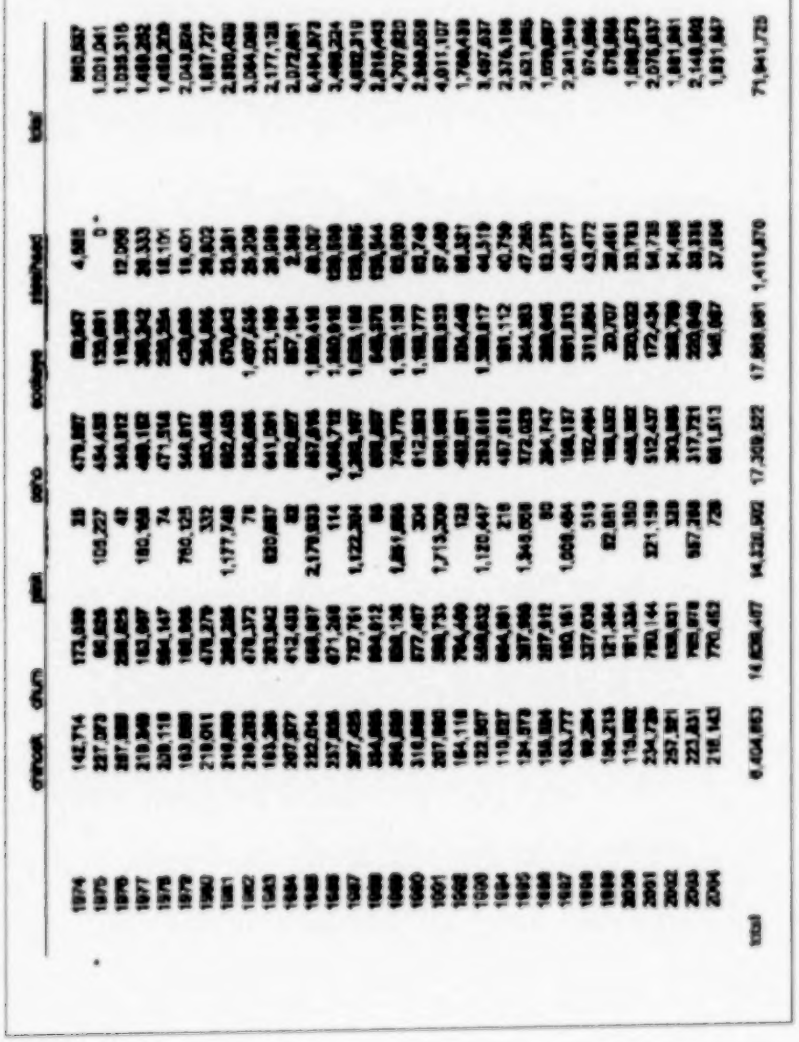
6. I declare under penalty of perjury and upon personal knowledge that the foregoing is true and correct based on the databases and information provided as part of this court case.

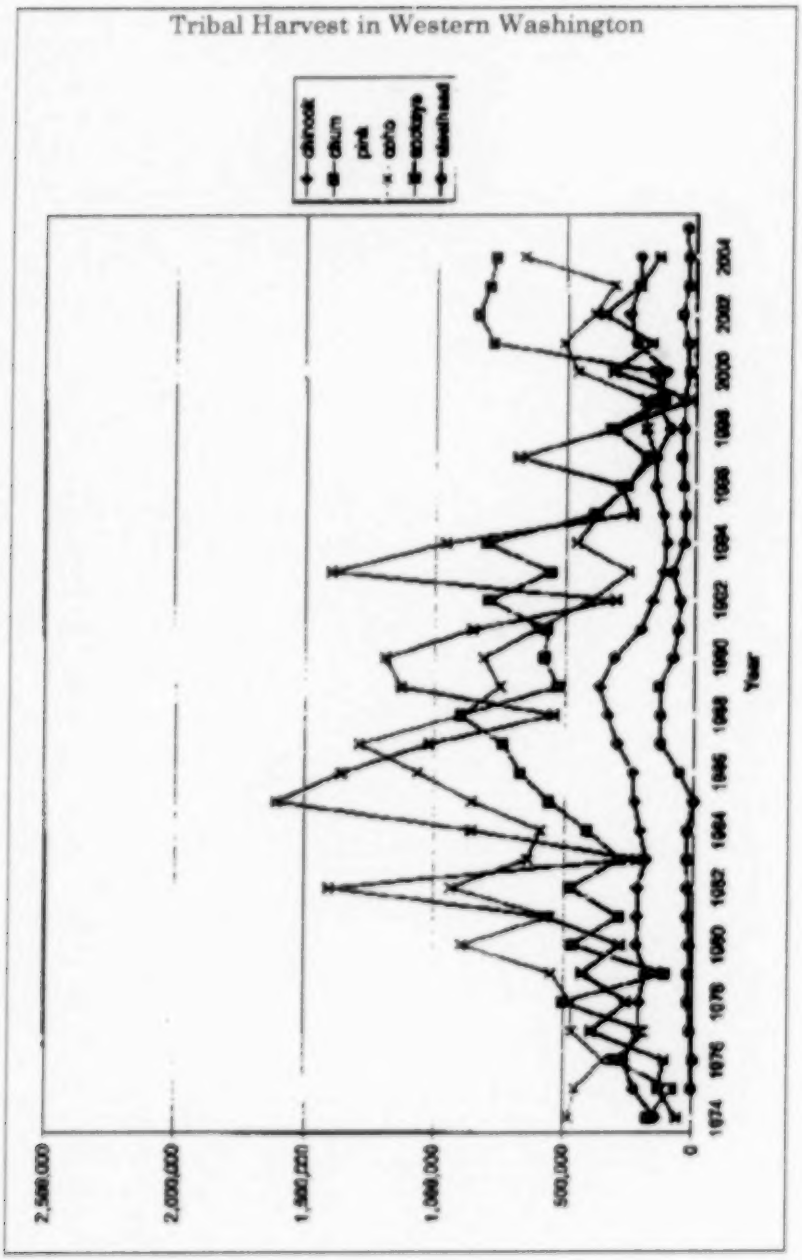
Date: *8/11/06*

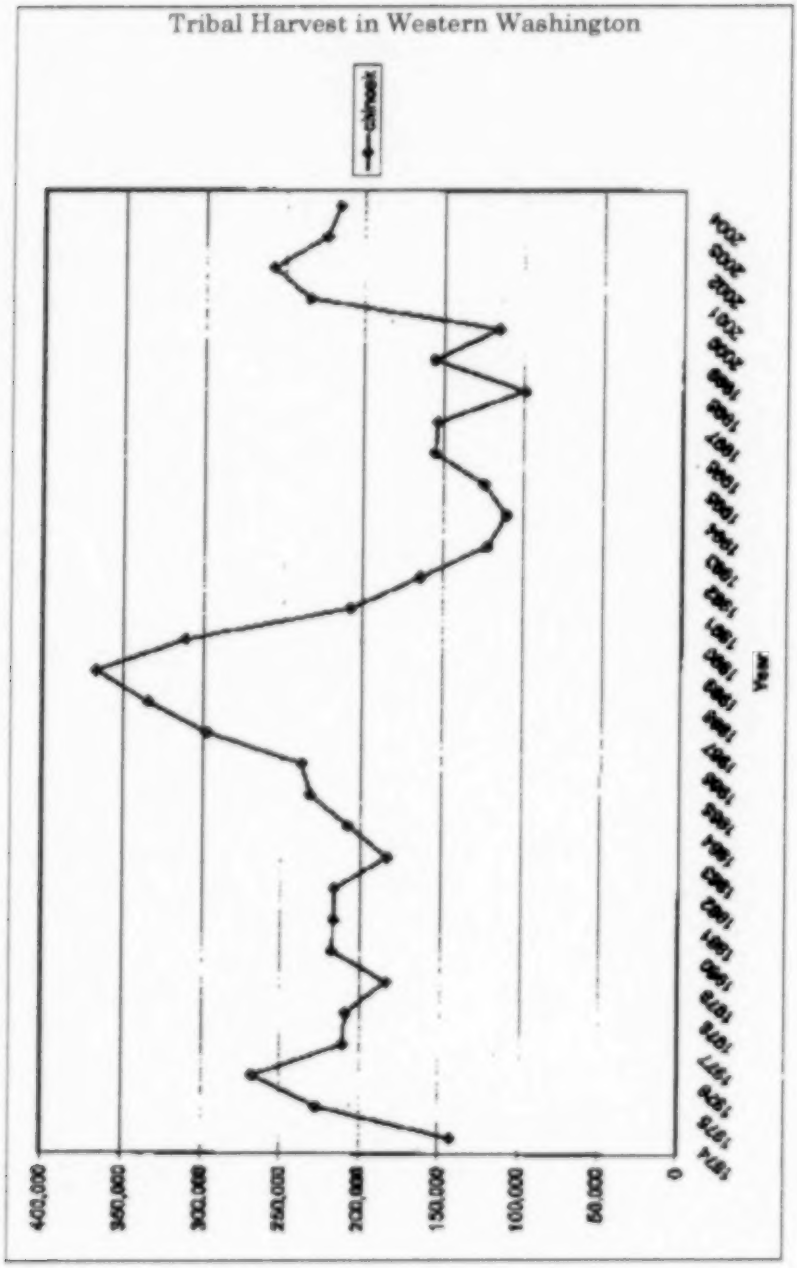
Name: *s/Keith Lutz*

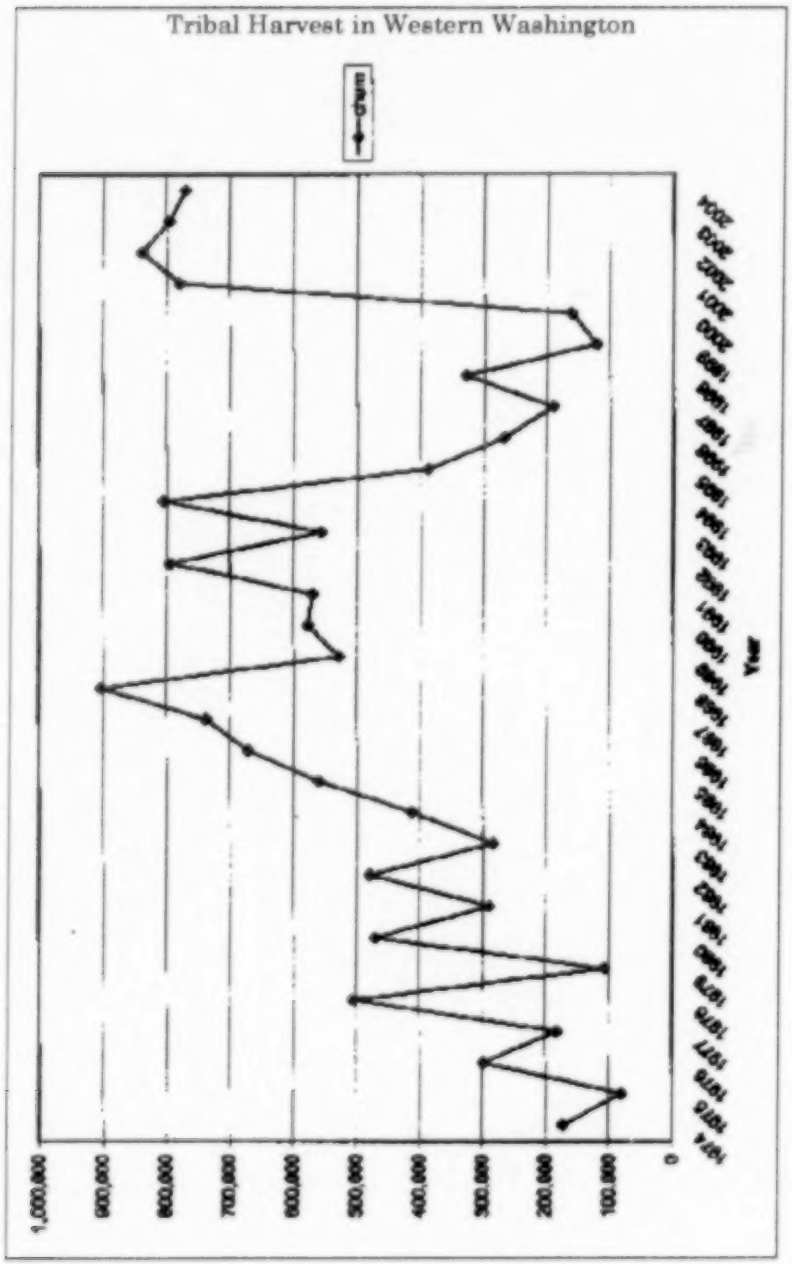
Keith Lutz

Table 1. Tribal harvest of salmon and steelhead in western Washington (Ocean, Coastal Rivers, Puget Sound and Puget Sound Rivers) from 1974-2004.




Tribal Harvest in Western Washington
chinook
chum
pink
coho
sockeye
steelhead
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004
Year


Tribal Harvest in Western Washington
chinook
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
Year


Tribal Harvest in Western Washington
Chum
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Year
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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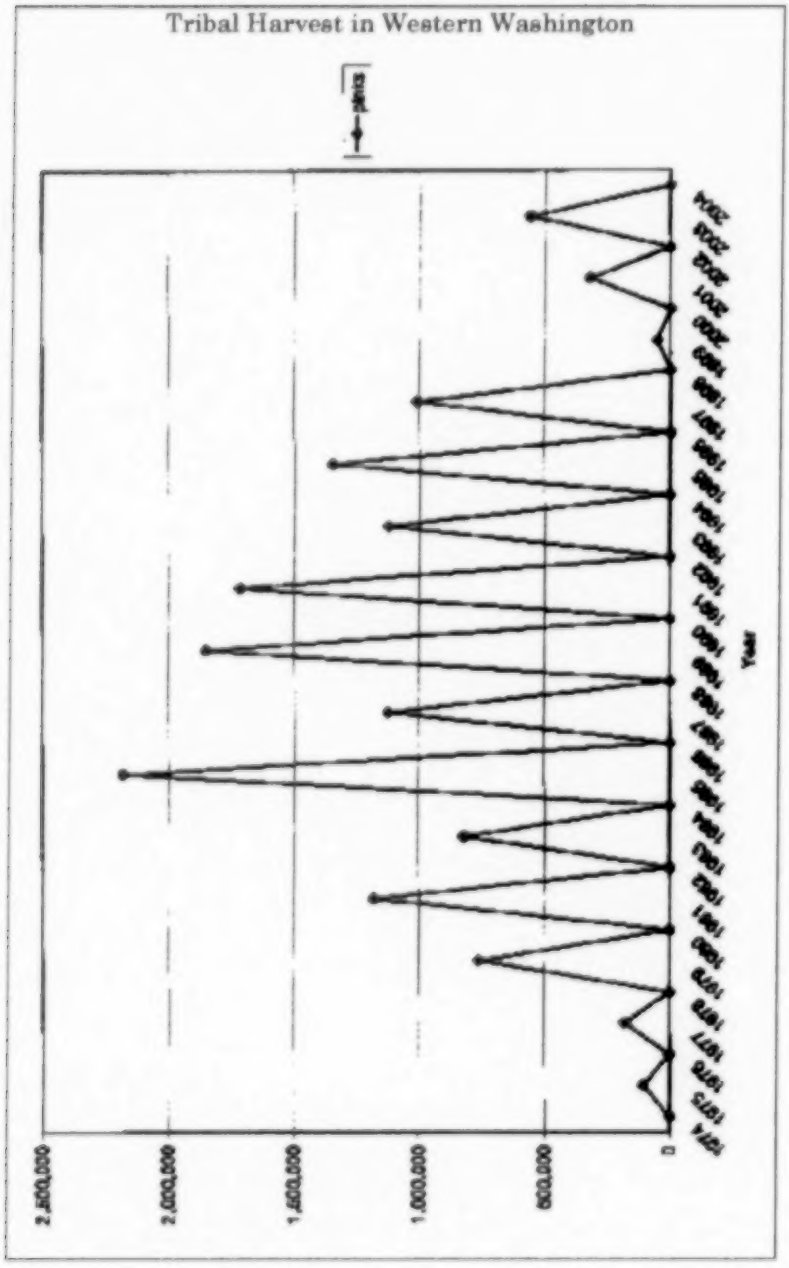
1997
1998
1999
2000
2001
2002
2003
2004


Tribal Harvest in Western Washington
coho
pinks
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1986
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1995
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1999
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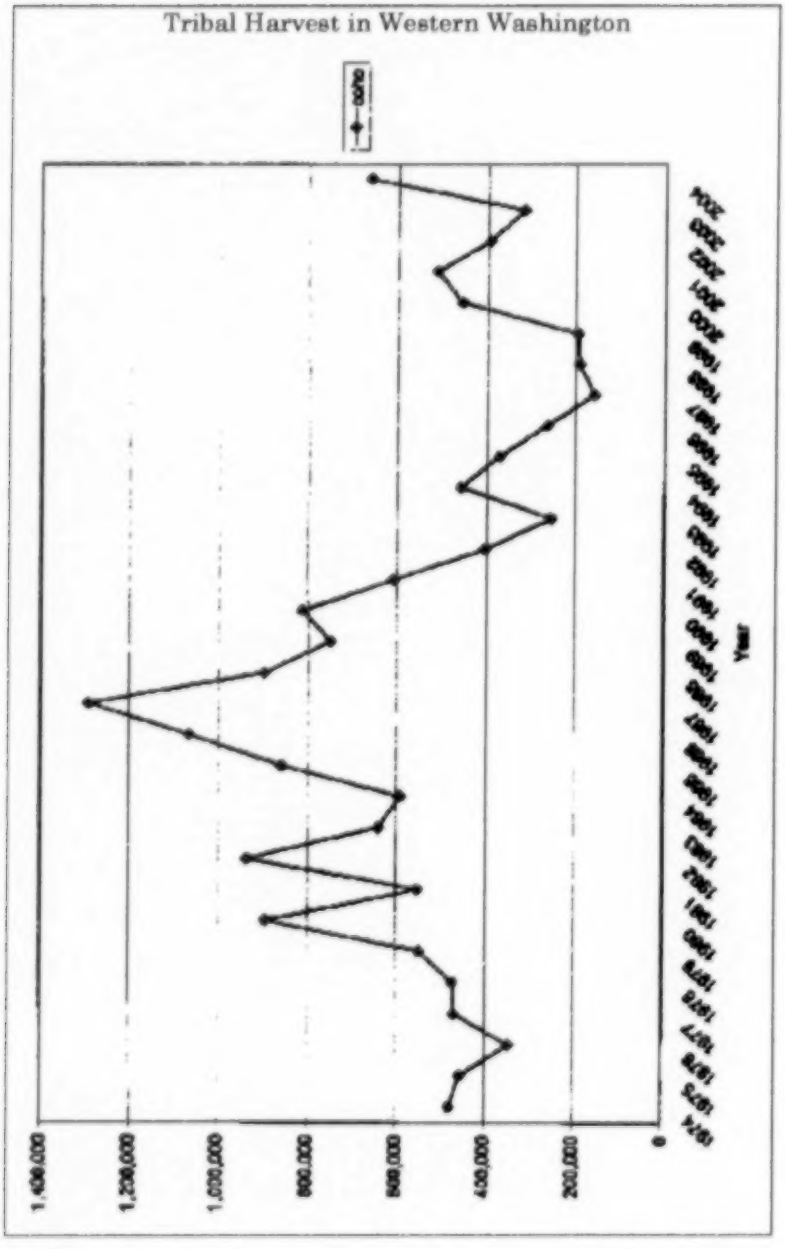
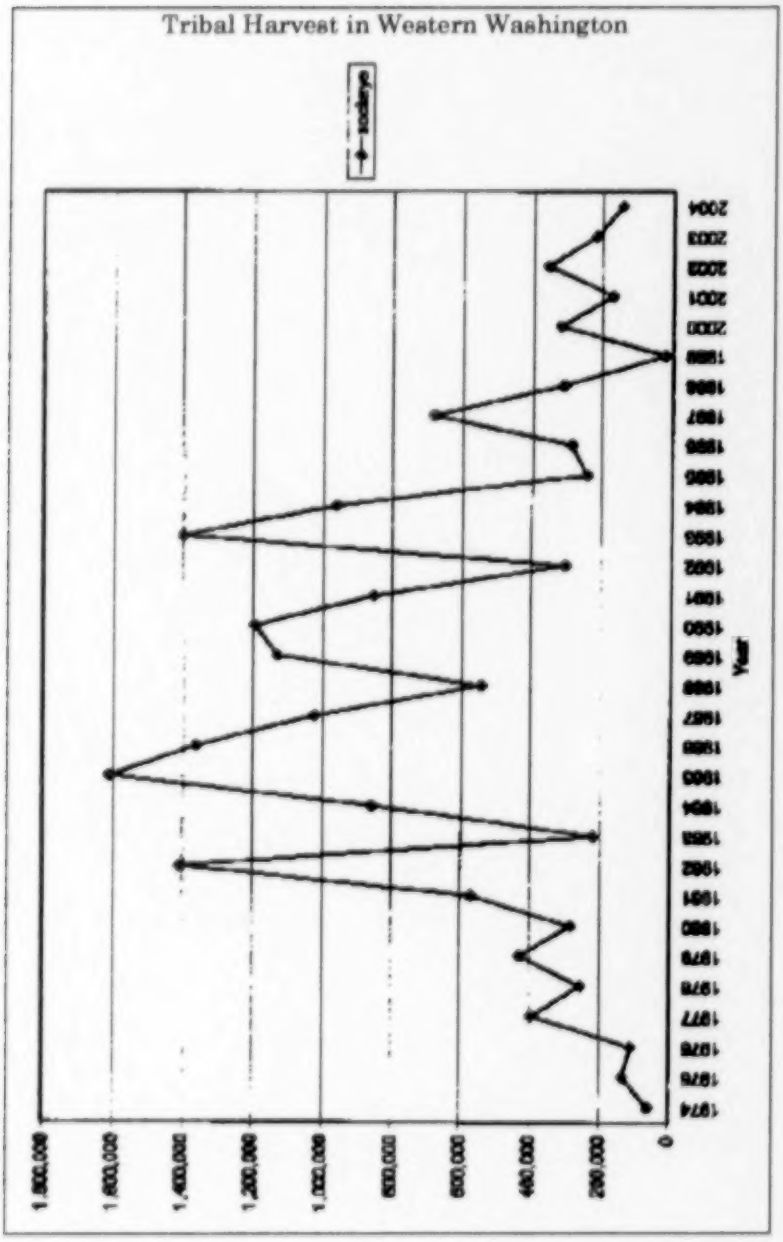
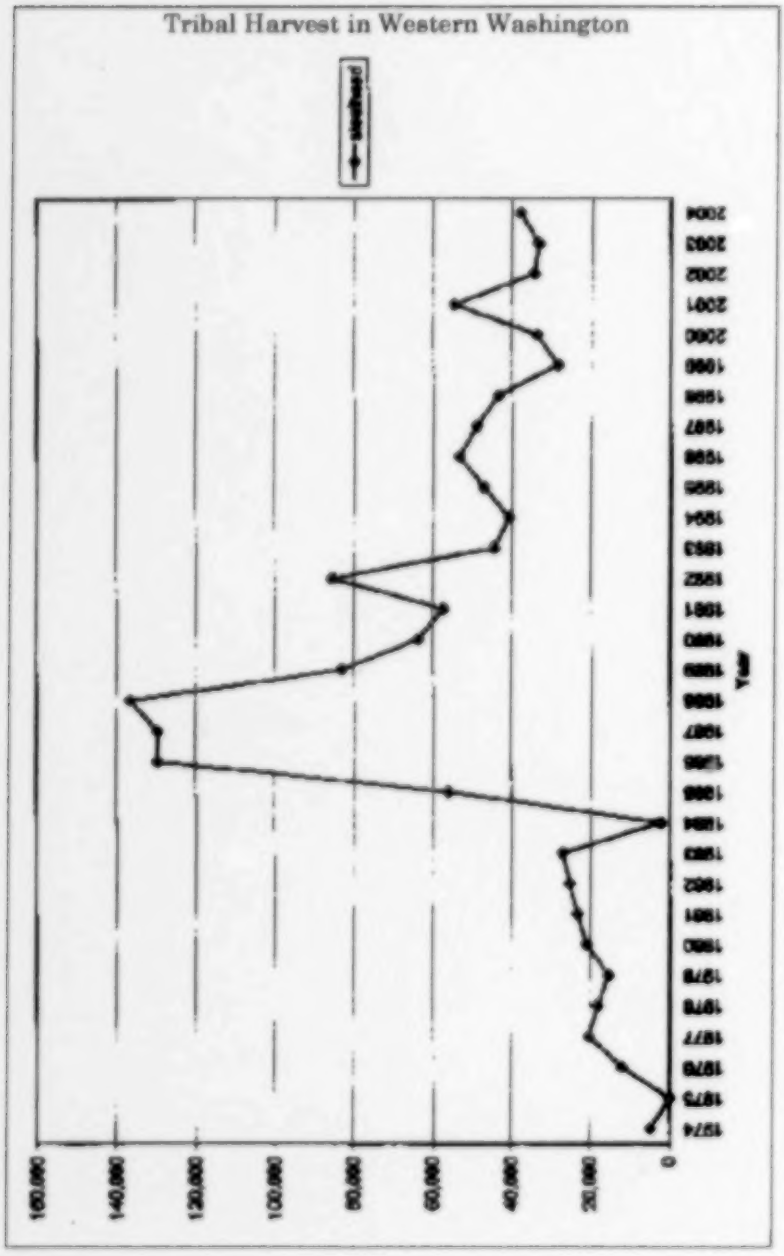
2001
2002
2003
2004
year


Tribal Harvest in Western Washington
Year
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0


Tribal Harvest in Western Washington
Year
2004
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
1989
1988
1987
1986
1985
1984
1983
1982
1981
1980
1979
1978
1977
1976
1975
1974
0


Tribal Harvest in Western Washington
steelhead
Year
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
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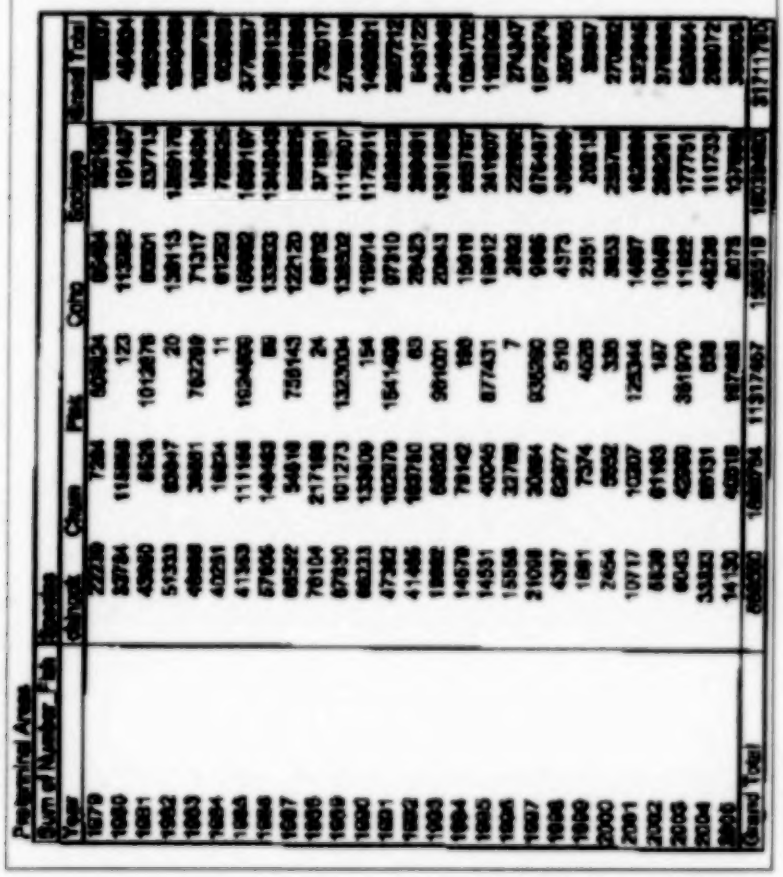
1999
2000
2001
2002
2003
2004

Table 2. Treat catch in Preterminal (Areas 4B, 5, 6, 6C, 7, 7A, 9). Data from NWIFC TFT database 5/2/06.



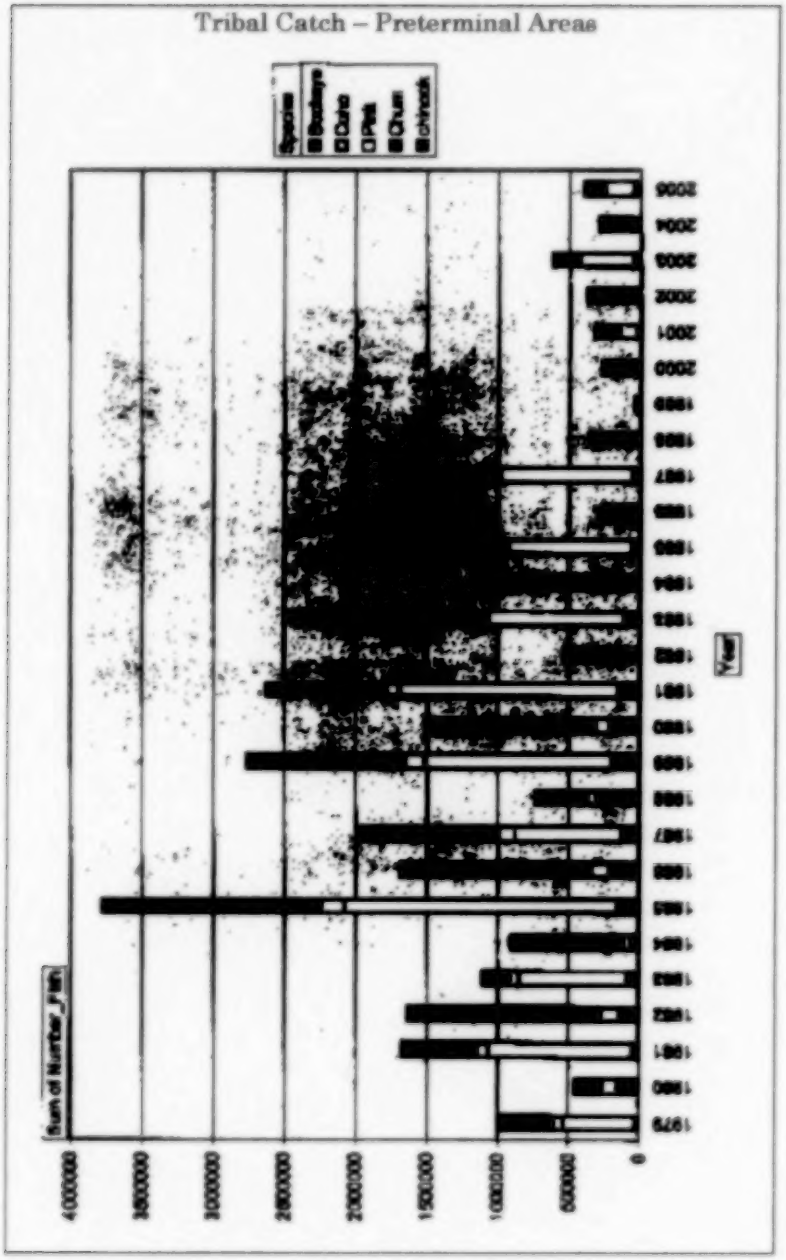
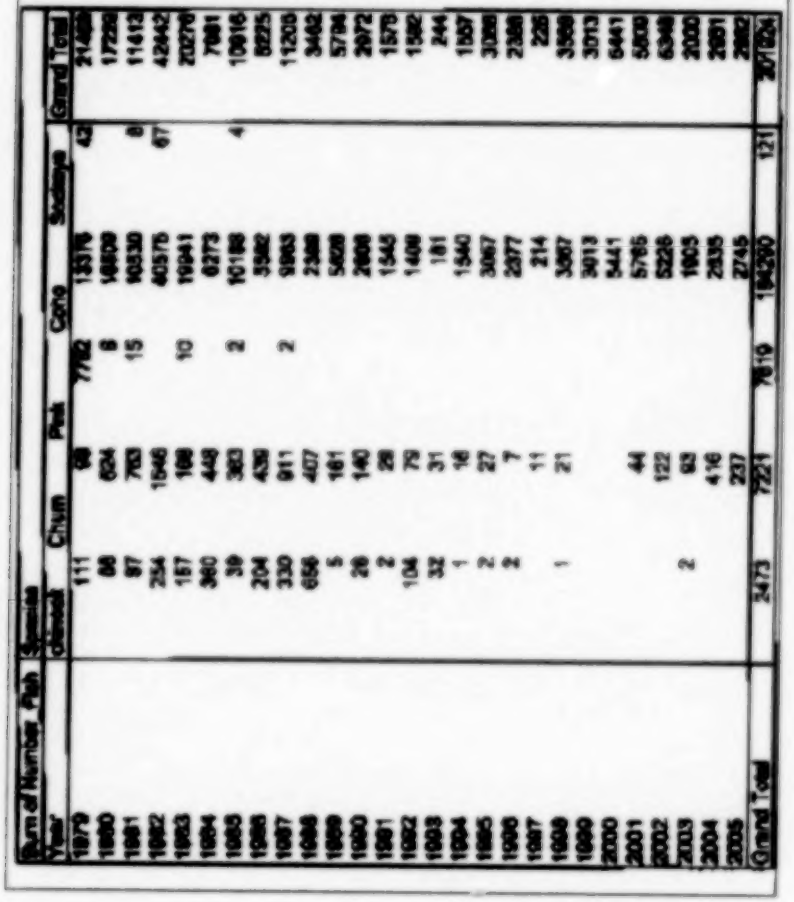

Tribal Catch – Preterminal Areas
Species
Sockeye
Coho
Pink
Chum
Chinook
Sum of Number_Fish
Year
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
2006
2004
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
1989
1988
1987
1986
1985
1984
1983
1982
1981
1980
1979

Table 3. Treaty catch in Strait of Juan de Fuca Terminal Areas (Areas 6B, 6D, 74B, 75A, 75C, 75E, 76A, 76B). Data from NWIFC TFT database 5/2/06.



Sum of Number_Fish	Species						
Year	Chinook	Chum	Pink	Coho	Sockeye	Steelhead	Grand Total
1979	111	99	7782	13516	42		21488
1980	88	624	6	14809			17258
1981	87	783	15	10330	8		11412
1982	254	1648		40575	67		42642
1983	157	188	10	19941			20276
1984	360	448	2	6373	4		7681
1985	39	363		10188			10616
1986	204	436	2	5982			8825
1987	330	911		9963			11209
1988	656	407		2388			3452
1989	5	161		5628			5794
1990	28	140		2808			2972
1991	2	28		1545			1575
1992	104	75		1409			1588
1993	32	31		181			244
1994	1	18		1540			1597
1995	2	27		3067			3096
1996	2	7		2377			2388
1997		11		214			225
1998	1	21		3567			3589
1999				3013			3013
2000				5441			5441
2001		44		5785			5829
2002	2	122		5226			5348
2003		62		1935			2000
2004		416		2535			2951
2005		237		2745			2982
Grand Total	2473	7221	7819	184260	121		207924

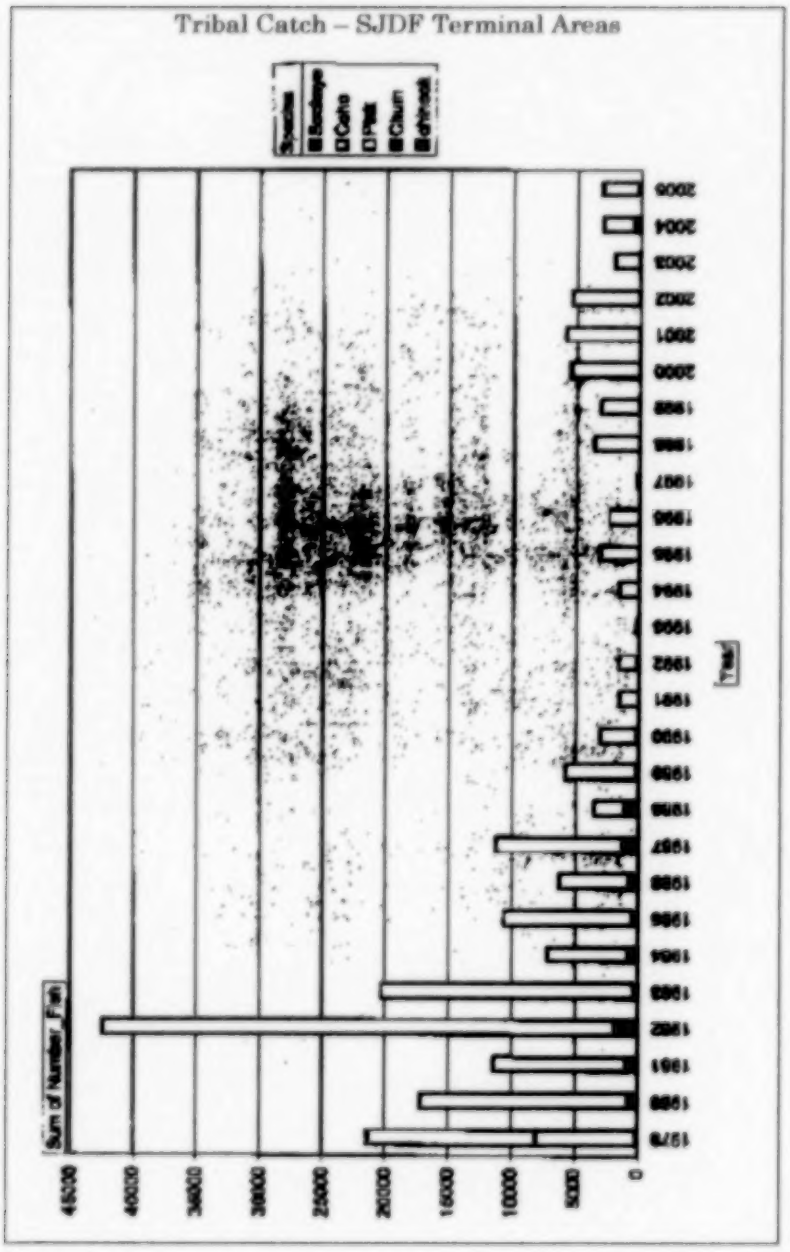

Tribal Catch – SJDF Terminal Areas
Species
Sockeye
Coho
Pink
Chum
Chinook
Sum of Number_Fish
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
Year
2005
2004
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
1989
1988
1987
1986
1985
1984
1983
1982
1981
1980
1979

Table 4. Treaty catch in Skagit Terminal Areas (Areas 8, 78C, 78D, Baker R.). Data from NWIFC TFT database 5/2/06.

Sum of Number Fish	Species						
Year	Chinook	Chum	Pink	Coho	Sockeye	Steelhead	Grand Total
1970	8881	11768	145328	16088	510		176072
1980	8166	53432	10	28880	49		89187
1981	10234	31162	101632	12820	175		155523
1982	11477	38914		22227	268		70884
1983	6163	28084	6244	12619	171		51231
1984	1759	870		1832	17		4488
1985	5853	36133	144297	7776	22		107083
1986	3451	111304		26565	33		143453
1987	3233	8548	311788	6806	416		330886
1988	2988	22543		11570	61		38576
1989	5011	7606	346661	7286	61		370178
1990	1667	83457	1	11735	27		96887
1991	2480	43403	120371	2760	186		169200
1992	1085	43547		3504	14		48220
1993	994	29088	138691	810	256		169849
1994	61	102002		710	67		102886
1995	2791	20877	383786	2759	37		420882
1996	49	25521		456			26026
1997	875	1135	36745	949	51		38855
1998	82	11038	1	8257	108		19486
1999	28	8597	31019	5719	6		45883
2000	53	14888	2	11148	32		25211
2001	37	12434	174884	15818			203675
2002		4808		7857			83888
2003	44	10724	142133	17768			170867
2004	20	6653		22838	1845		42357
2005	1740	14000	17787	17900	144		52201
Grand Total	76668	634008	2112282	300182	4800		3327882

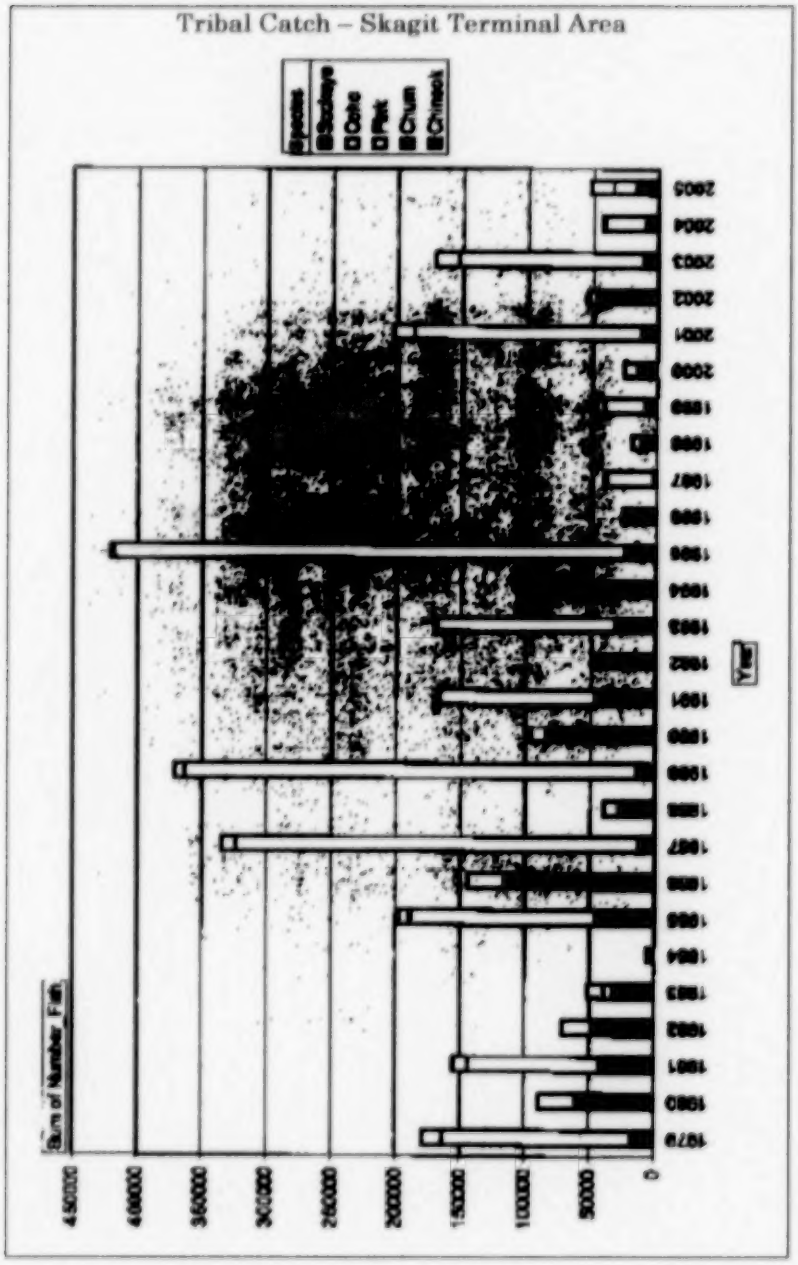
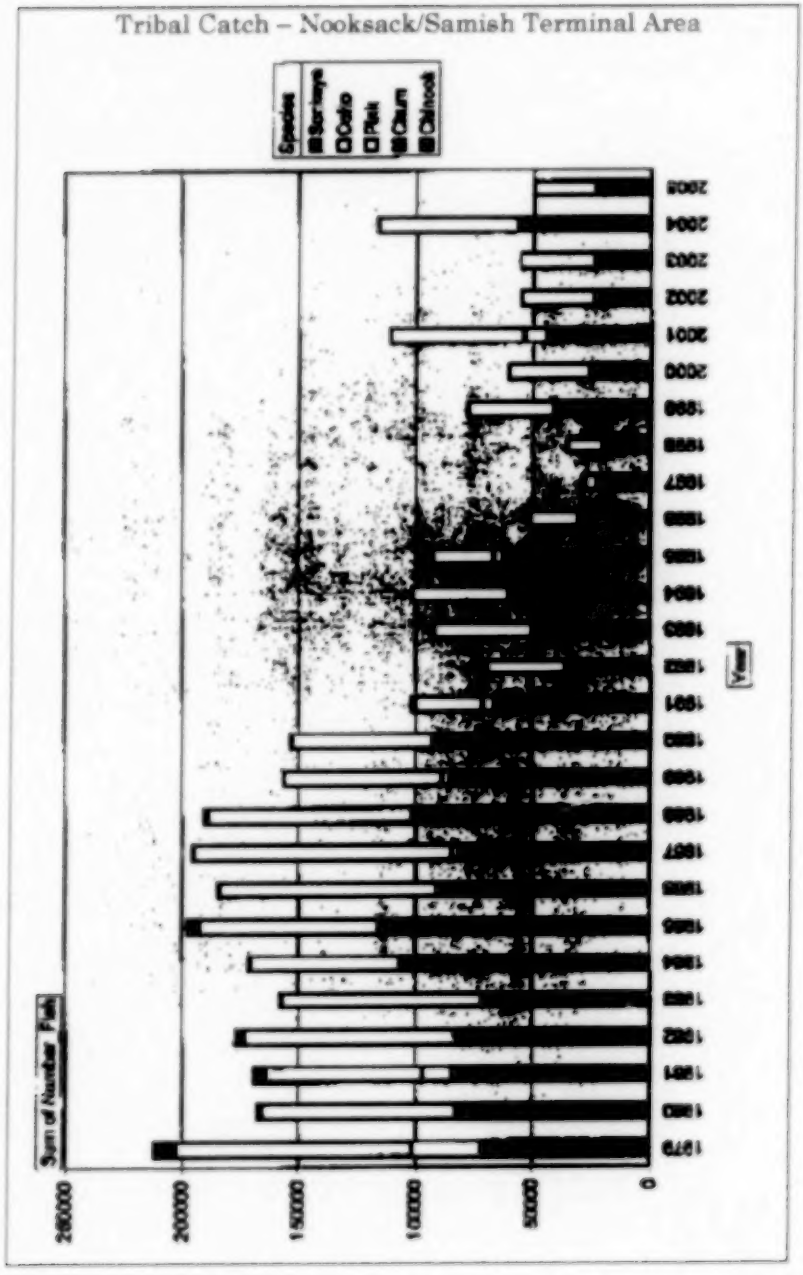

Tribal Catch – Skagit Terminal Area
Species
Sockeye
Coho
Pink
Chum
Chinook
Sum of Number Fish
Year
450000
400000
350000
300000
250000
200000
150000
100000
50000
0
2005
2004
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
1989
1988
1987
1986
1985
1984
1983
1982
1981
1980
1979

Table 5. Treaty catch in Nooksack/Samish Terminal Areas (Areas 7B, 7C, 7D, 7E, 83D, 83F). Data from NWIFC TFT database 5/2/06.

Sum of Number_Fish	Species					
Year	Chinook	Chum	Pink	Coho	Sockeye	Grand Total
1975	46460	26620	26684	100339	8880	212887
1980	63968	16390	12	82858	2433	167665
1981	43969	40763	12678	89885	5015	192620
1982	37310	45653		80465	3950	176888
1983	30887	38229	2210	85005	741	157572
1984	58897	48868	5	63388	819	170817
1985	86828	57212	1785	76530	5747	188112
1986	37108	59434	3	82771	1120	184436
1987	28068	54683	2917	110484	488	196641
1988	28661	72804	2	87018	1459	190032
1989	22617	82185	3679	87087	257	196035
1990	45261	47915	5	58047	930	163948
1991	18821	47828	4978	28888	1728	101774
1992	10549	26288	6	29573	333	66808
1993	16135	32781	625	42764	187	92802
1994	18783	41497	3	41061	31	101575
1995	19913	43884	3606	26516	46	93745
1996	17254	13038		21139	9	51434
1997	15773	8260	518	6000	734	29882
1998	15382	4772		15085	4	36224
1999	33489	6132	1434	35705	10	77827
2000	21605	4111		34171	7	60094
2001	37885	6639	9307	57177		111208
2002	22833	1425		30729	245	55232
2003	18873	5716	1264	31764	74	58820
2004	12738	44085		88640	53	145534
2005	13948	873	339	23883	67	40370
Grand Total	765414	658216	76118	1473480	36109	3231336


Tribal Catch – Nooksack/Samish Terminal Area
Species
Sockeye
Coho
Pink
Chum
Chinook
Sum of Number Fish
250000
200000
150000
100000
50000
0
Year
2005
2004
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
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1989
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1986
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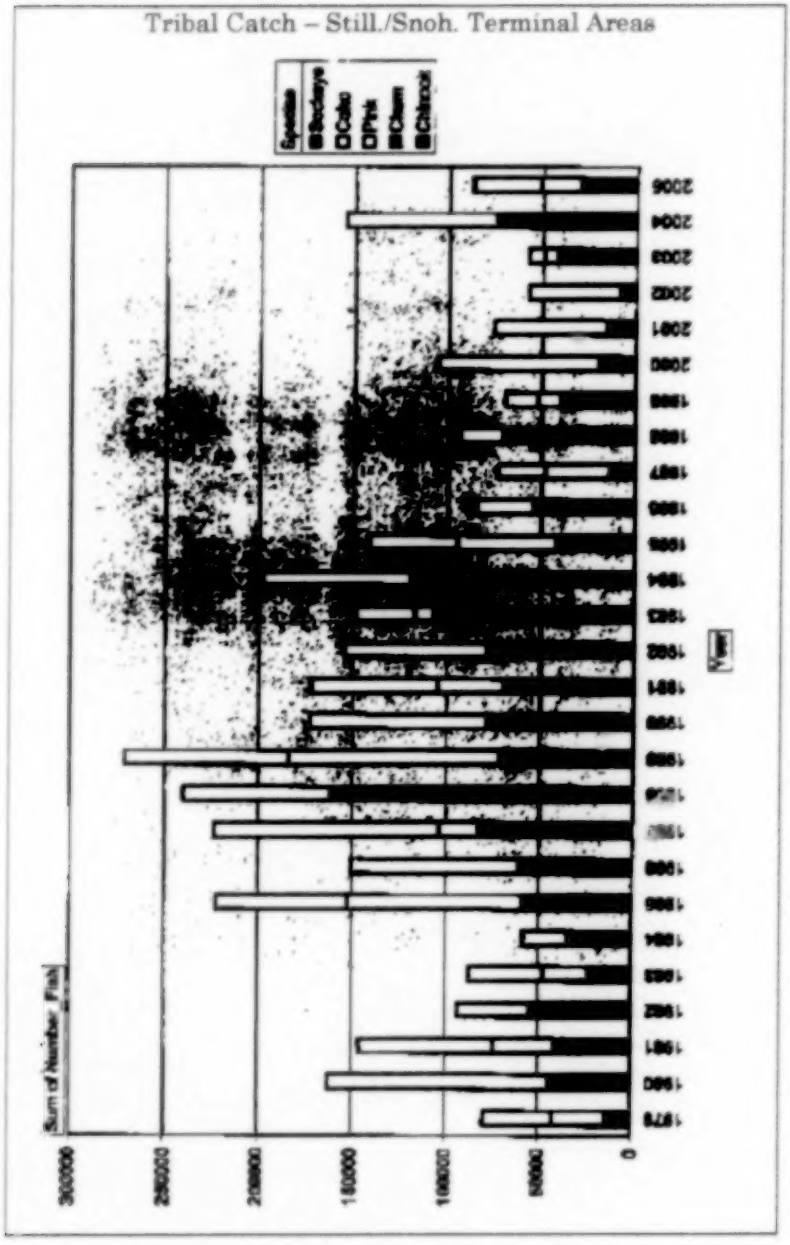
1984
1983
1982
1981
1980
1979

Table 6. Treaty catch in Stillaguamish/Snohomish Terminal Areas (Areas 8A, 8D, 78G, 78F). Data from NWIFC TFT database 5/2/06.

Sum of Number Fish	Species						
Year	Chinook	Chum	Pink	Coho	Sockeye	Steelhead	Grand Total
1979	11757	2421	26008	37426	101		77713
1980	20832	29834	4	117881	208		168757
1981	16167	25054	33284	71184	41		145730
1982	10914	43974	12	98825	139		153864
1983	12288	10352	28331	38808	56		89835
1984	8749	24818		23746	1		57315
1985	8722	50478	92510	70882	4		222596
1986	11882	49467		89140			150489
1987	4095	78519	21189	119434	7		223184
1988	7988	153085	17	78864	28		240032
1989	9282	62240	112417	86891	204		270969
1990	9106	68222	60	94116	5		172529
1991	5814	63888	34780	67824	17		172314
1992	3886	74864	21	75714	1		154475
1993	4013	103047	9833	31482			148155
1994	4641	114118		78653			197413
1995	8722	39981	52344	40886	33		141980
1996	11327	42705	43	30228			84302
1997	8322	5745	34178	24917	15		73128
1998	7068	63374		23588			94030
1999	14441	25932	12027	17643	85		69928
2000	8047	13908		85445			105416
2001	3883	8240	3364	68888			79480
2002	1975	6884		48573			57432
2003	7030	35183	7231	8322			57766
2004	4440	70811		78118	364		153731
2005	8887	24160	21017	36472	171		91707
Grand Total	228737	1270418	487600	1901258	1496		3379844


Tribal Catch – Still./Snoh. Terminal Areas
Sockeye
Coho
Pink
Chum
Chinook
Sum of Number_Fish
300000
250000
200000
150000
100000
50000
0
2006
2004
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
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1988
1987
1986
1985
1984
1983
1982
1981
1980
1979

Table 7. Treaty catch in South Sound Terminal Areas (Areas 10, 10A-G, 11, 11A, 13, 13B, 13C, 13D-K, 8OA, 80B, 8OC, 81A, 81B, 81C, 83A, 83B, 83C, 83D, 83E, 83F, 83H). Data from NWIFC TFT database 5/2/06.

Sum of Number Fish	Species						
Year	Chinook	Chum	Pink	Coho	Sockeye		Grand Total
1979	28647	31518	22127	258448	2882		383443
1980	31611	1016539	0	334330	68888		646877
1981	26147	102284	8501	176835	1607		315884
1982	21701	126218		328816	14484		491220
1983	45251	88003	5178	288300	31730		458762
1984	40484	128005	14	270482	57823		497808
1985	38616	109088	3700	331888	4105		488229
1986	23042	97608		417668	9814		548723
1987	40082	162863	4873	644888	11760		864467
1988	49877	169446	7	477985	128420		845808
1989	51016	110885	22531	288811	1739		482751
1990	64088	131876	3	323457	3870		522004
1991	30949	95779	2335	164478	302		293832
1992	31508	141078	1	128832	293		301712
1993	24457	101708	1312	61885	88		189628
1994	31986	112008		255438	6		399432
1995	33702	78422	4053	154881			271158
1996	20669	47690		65872	57016		194456
1997	12107	13472	88	76722	19		102408
1998	15067	35382		58228			108677
1999	21038	18807	64	17830	11		53258
2000	16864	40565		188883	52529		298841
2001	21588	137882	588	149840	2407		312080
2002	18429	88275	84	118800	26888		233302
2003	15388	104018	2851	115817			237884
2004	26888	223331		218126	17524		485870
2005	28023	81720	1780	137082			257484
Grand Total	676581	2744884	80140	5883634	438219		10008704

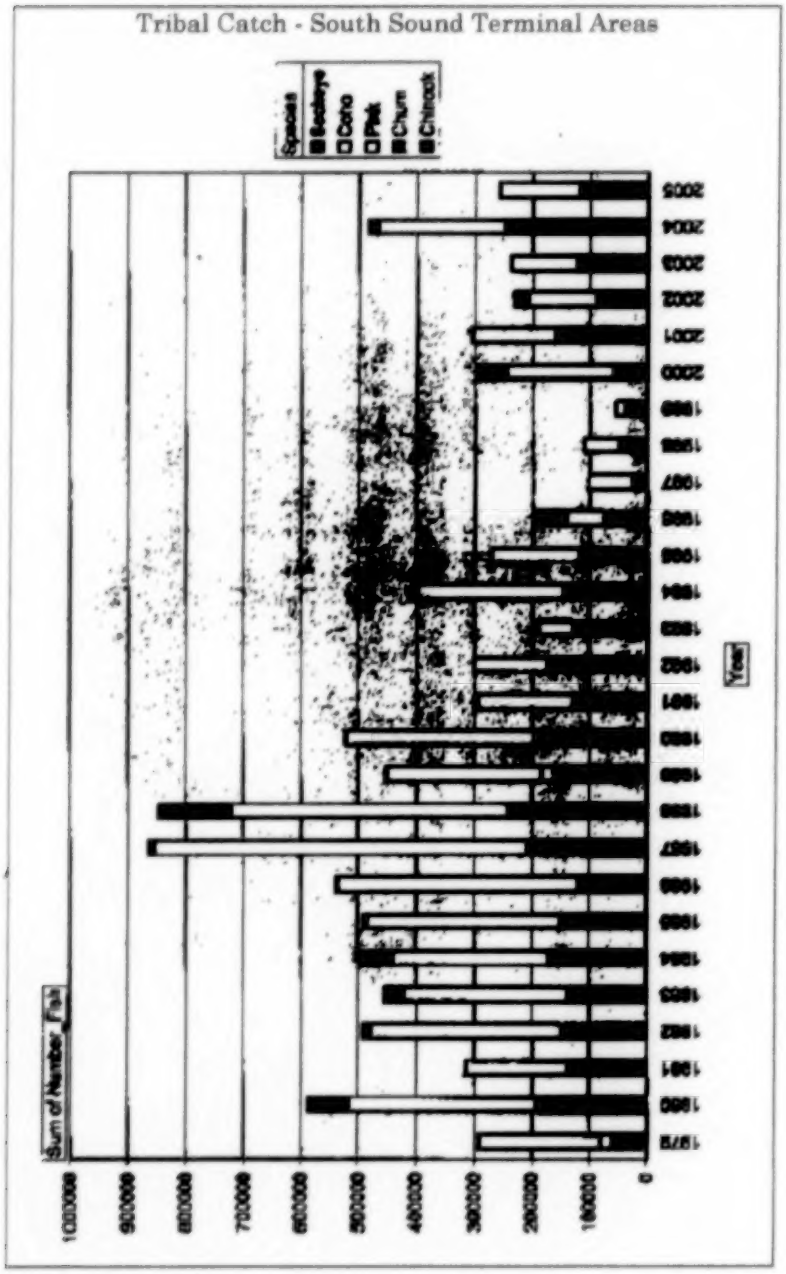
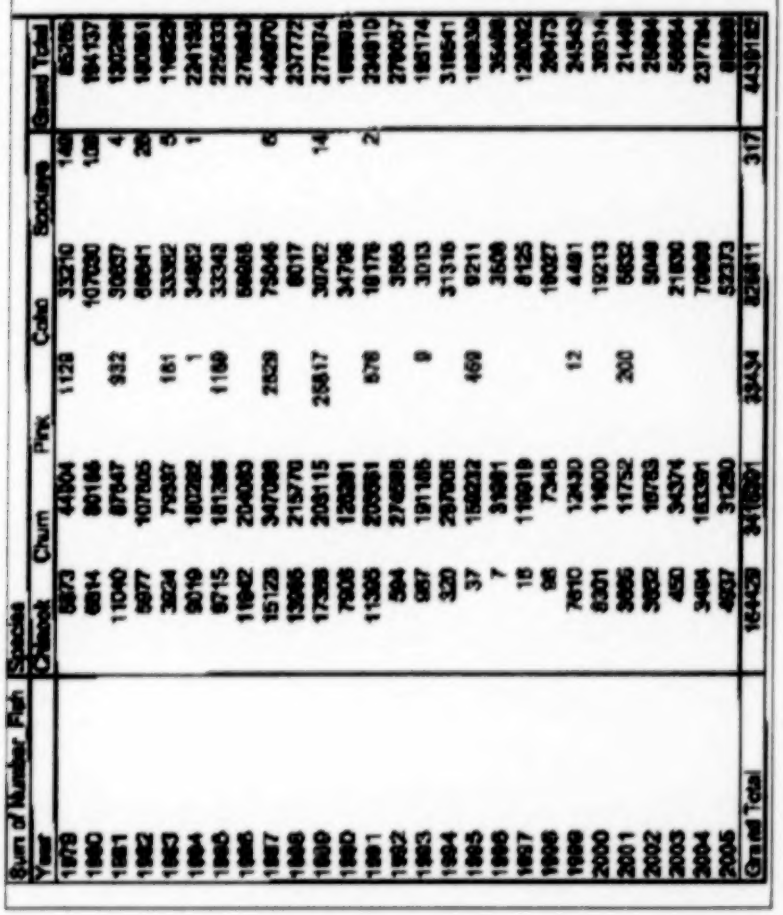

Tribal Catch - South Sound Terminal Areas
Species
Sockeye
Coho
Pink
Chum
Chinook
Sum of Number_Fish
Year
1000000
900000
800000
700000
600000
500000
400000
300000
200000
100000
0
2005
2004
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
1989
1988
1987
1986
1985
1984
1983
1982
1981
1980
1979

Table 8. Treaty catch in Hood Canal Terminal Areas (Areas 12, 12A, 12B, 12C, 12C, 12D, 82A-J.) Data from NWIFC TFT database 5/2/06.



Sum of Number Fish	Species						
Year	Chinook	Chum	Pink	Coho	Sockeye		Grand Total
1979	8873	44804	1128	33210	149		88164
1980	6814	80186		107030	108		194137
1981	11040	87947	932	30657	4		130580
1982	5977	107805		66841	28		180651
1983	3624	79397	161	33362	5		116549
1984	5019	180282	1	34852	1		224155
1985	8715	181388	1189	33343			225633
1986	11842	204083		59868			275793
1987	15123	347088	2529	75846	6		440670
1988	13085	213770		8017			234872
1989	17388	208115	25817	30762	14		277874
1990	7008	128881		34708			170597
1991	11305	205681	878	18176	2		236042
1992	584	276888		3565			281037
1993	967	191105	9	3013			195174
1994	320	287905		31316			319541
1995	37	158232	469	9211			168039
1996	7	31981		3500			35488
1997	18	119019		8125			128062
1998	68	7345		19027			26473
1999	7610	12430	12	4481			24533
2000	8301	11600		19213			39114
2001	3885	11752	200	6632			21469
2002	3052	16783		9048			28884
2003	450	34374		21830			56654
2004	3484	183591		70668			237744
2005	4837	31280		53373			89490
Grand Total	164429	3410891	33434	826811	317		4436182

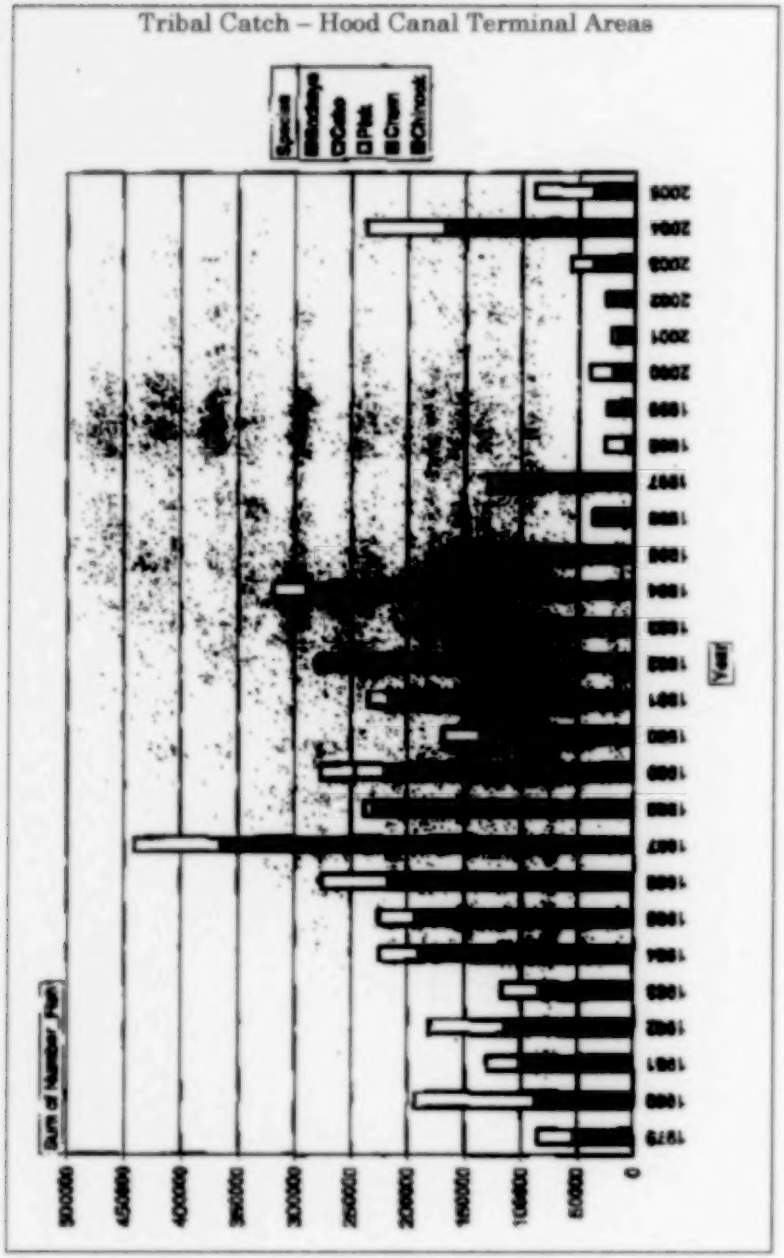

Tribal Catch – Hood Canal Terminal Areas
Sum of Number_Fish
Year

Table 9. Treaty catch of Sockeye in preterminal areas (4B, 5, 6, 6C, 7, 7A, 9) assumed to be primarily Fraser River origin and terminal area (10, 10A-G, 11, 11A, 13, 13B, 13C, etc.) assumed to be Lake Washington or other US origin stocks.

	CAN Origin (1)	US Origin (2)
1979	[illegible]	[illegible]
1980	181,487	[illegible]
1981	697,719	1,957
1982	[illegible]	14,494
1983	[illegible]	91,730
1984	[illegible]	[illegible]
1985	[illegible]	4,169
1986	[illegible]	5,614
1987	[illegible]	11,730
1988	371,981	[illegible]
1989	[illegible]	1,739
1990	[illegible]	[illegible]
1991	[illegible]	[illegible]
1992	[illegible]	[illegible]
1993	[illegible]	[illegible]
1994	[illegible]	[illegible]
1995	941,897	
1996	[illegible]	57,015
1997	[illegible]	19
1998	[illegible]	
1999	[illegible]	11
2000	[illegible]	[illegible]
2001	[illegible]	[illegible]
2002	[illegible]	[illegible]
2003	177,781	
2004	[illegible]	[illegible]
2005	[illegible]	
[illegible]	[illegible]	[illegible]

(1) Stocks in this category are predominantly Fraser River stocks that are of Canadian origin. This category is know to include a small amount of inter-mingled US origin (Baker River, Lake Washington, Misc.) stocks but their numbers are considered minor in comparison.

(2) Stocks in this category are predominantly Lake Washington stocks that are of US origin. There are other minor US origin stocks that may not be accounted for in this table.

THE HONORABLE RICARDO MARTINEZ

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, vs. STATE OF WASHINGTON, et al., Defendants	Case No.: C70-9213 Subproceeding No. 01-1 (Culverts) DECLARATION OF RONALD McFARLANE IN SUPPORT OF PLAINTIFF-TRIBES' MOTION FOR SUMMARY JUDGMENT

I, Ronald McFarlane, hereby declare as follows:

1. I am over the age of eighteen, a United States citizen, and am competent to testify as to the matters here set forth. I make this affidavit on the basis of my personal knowledge, skill, experience, training, education, review of the State's culvert databases. This affidavit is made by me for the purpose explaining how I derived the following information related to state-owned culverts as part of United States v. Washington, 01-1 (Culverts).

2. For the past 8 years (1998-Present). I have been the Geographic Information System (GIS) Technician for the Northwest Indian Fisheries Commission. I have also been a GIS instructor at the Grays Harbor College for 6 years (2000-2005), teaching Introduction to GIS, Cartography, ARCINFO, Arcview, GIS Special Topics, and GIS Work Co-op.

3. My education includes an Associate in Applied Science in GIS from Grays Harbor College. My degree

included classes in programming languages for ARCINFO and ARCVIEW, GIS theory, cartography, Microsoft Access, and wildlife management.

4. I was requested by counsel for Plaintiff Tribes in this sub-proceeding to examine certain State databases that contain information regarding the location and fish passage status of culverts owned by the State Departments of Transportation (WDOT), Fisheries and Wildlife (WDFW), Parks and Recreation (WDP), and Natural Resources (DNR). Specifically, I was asked, using my experience in to GIS, to apply standard GIS protocols to data in the databases to determine the numbers of fish-blocking State culverts within the *United States v. Washington* "Case Area."

5. I utilized the following state-managed databases to generate the information related to state-owned culverts: Shapefile format, dated 3/27/06 (culverts.shp) for WDFW/WDOT, Shapefile format, dated 5/10/06 (DNR_Culverts.shp) a separate Excel spreadsheet supplied listing 152 repaired WDNR culverts in the ease area, ("Copy of DNR update of culverts for 1st 2nd set(2)", a separate database table listing WDOT culvert repairs (WSDOT_FX.dbf), dated 3/27/06 and a separate Excel spreadsheet for WDP, dated 7/10/06 (culvert info-all.xls). All spatial data was projected to the same projection coordinate system prior to analysis.

6. All of the data used in generating my conclusions was provided to me by John Sledd, attorney for various plaintiff-tribes. To the best of my knowledge, all of my conclusions are based on the State's databases and information provided by the State as part of this court case.

7. All of the data analysis I used are standard protocols used by GIS professionals, as described below in paragraphs l l, 12, and 13; however, due to a lack of some information (primarily metadata), I made so-me assumptions based on my experience, which are discussed below in paragraphs l l(f), 12(f), and 13(e):

8. **WDFW /WDOT Conclusions.**

After performing the data analysis described below on the WDFW/WDOT culvert data, I conclude from that data that there are 3,340 WDFW/WDOT culverts in the case area. 1,113 culverts are identified as barriers with fish present. Of the 1,113 fish barrier culverts, 806 are classified as "Repair Required," 237 as "Limited Gain," 67 as "Undefined," and 3 are not defined. 49 culverts in 43 sites are classified as "fixed." Of the 1,113 fish barrier culverts, none appear to be duplicates of the WDP culvert dataset and 7 of the culverts could be duplicates of the DNR culvert dataset.

9. **WDNR Conclusions**

After performing the data analysis described below on the DNR culvert data, I conclude from that data that there are 5,302 DNR culverts in the case area. 665 of the 5,302 WDNR culverts are marked with identifiers that show the streams are used by fish and that the culverts are barriers. Although the main dataset for WDNR did not have a field for "repaired," a separate WDNR spreadsheet was supplied by John Sledd showing 152 repaired WDNR culverts. Of these, only 82 culverts readily matched the main WDNR dataset. 26 of these 82 culverts are marked as in fish bearing streams and 13 are still shown as barriers, despite their presence in the repair spreadsheet Of the 665 fish barrier culverts, none appear to be duplicates of

the WDP culvert dataset and 7 of the culverts could be duplicates of the WDFW/WDOT culvert dataset.

10. **WDP Conclusions**

After performing the data analysis described below on the WDP culvert data. I conclude from that data that there are 436 WDP culverts in the case area. 85 of the 436 WDP culverts in the case area are marked with identifiers that show they are used by fish and that they are barriers. None of the 436 WDP culverts are marked as repaired. None of these culverts appear to be duplicates of the WDNR culvert database or of the WDFW/WDOT culvert database.

11. **WDFW/WDOT Analysis Performed**

(a) I received the main and supplemental WDFW/WDOT data from John Sledd in Shapefile format, dated 3/27/06 (culverts.shp).

(b) I converted the data to Coverage format.

(c) I clipped the data to the case area, Washington Water Resource Inventory Areas (WRIAs) I-23.

(d) I Snapped the culvert points to DNR 1:24000 scale stream layer (March 06) at a distance of 80 feet (based upon the scale accuracy of +/-40 feet for the hydrography data).

(e) I generated a count of records matching the data breakout.

(f) Note: Metadata was provided, dated August 2005.

(i) Scale accuracy of the data is +/-100 feet per the metadata.

(ii) Fish use was determined by the records (Fish use value of "Yes"), not by checking against a spatial dataset of fish distribution.

(iii) Barrier status was determined by the records (barrier field value of "Yes").

(g) WDOT Repaired List (WSDOT_FX.dbf, dated 3/27/06)

(i) 132 repairs statewide

(ii) 64 match site ids for the WDFW/WDOT culvert database for the case area. The breakout is as follows:

1) 3 do not have fish presence

2) 2 have unknown fish presence

3) Of the 59 remaining:

a. 4 are defined as "Require Repair." Note all 4 of these show a repair year of 2005 - It is unclear whether they have been fixed and are not yet in the database, the: repairs were inadequate, or some other possibility.

b. 1 is defined as "Limited Gain."

c. 2 are defined as "Undefined"

d. 9 are defined as "OK"

e. 43 are defined as "Fixed"

(h) 28 match site ids for the WDFW/WDOT fish way database for the case area. All are defined as barrier - "No".

12. **WDNR Analysis Performed**

(a) I received the main and supplemental DNR data from attorney John Sledd in a Shapefile format, dated 5/10/06 (DNR_Culverts.shp).

(b) I converted the data to Coverage format.

(c) I clipped the data to the case area (WRIAs 1-23).

(d) ! Snapped the culvert points to DNR I :24000 scale stream layer (March 06) at a distance of 80 feet (based upon the scale accuracy of +/-40 feet for the hydrography data).

(e) I generated a count of records matching the data breakout.

(f) Note: Metadata was provided, dated September 2002.

(i) Scale accuracy of the data is +/-40 feet per the metadata.

(ii) Fish use was determined by the records provided in the database (anadflg or resflg value of 1), not by checking against a spatial dataset offish distribution.

(iii) Barrier status was determined by the records provided in the database (barrier field value of 20 or 30).

13. **WOP Analysis Performed**

(a) I received the Parks data from attorney John Sledd in an Excel spreadsheet format, dated 7/10/06 (culvert info-all.xis).

(b) I converted it to Access database format, extracted the culvert records, and then separated the

data into those records with specific spatial locations and those with general locations.

(c) For the records with specified locations:

(i) I converted the data to ESRI coverage format. ESRI is Environmental Systems Research Institute, Inc. ("ESRI")

(ii) I projected the data to the State-plane coordinate system.

(iii) I clipped the data points to Water Resource Inventory (WRIAs) 1-23, which essentially corresponds to the case area.

(iv) I snapped the culvert points to DNR 1:24000 scale stream layer (March 06) at a distance of 80 feet (based upon the scale accuracy of +/-40 feet for the hydrographic data).

(v) I generated a count of records matching the data breakout.

(d) For the records without specific locations:

(i) A manual check was performed to determine if the specified park was in the case area or not.

(ii) For those records that fell within the case area, I generated a count of records matching the data breakout.

(e) Note: as metadata was not provided with the data set several assumptions were made.

- The spatial coordinate systems for the records with specific locations were assumed to be using the North American datum of 1927. This is ESRIs default datum for the Geographic Coordinate System when a datum is not

specified. The WGS84 datum could have been used if I knew the data was collected using a GPS Unit with the default datum, but without metadata about collection. I just let the program decide the default datum.

- Fish use was determined by the records, not by checking against a spatial dataset of fish distribution.
- Barrier status was determined by the records provided in the spreadsheet.
- Other fields were difficult to use without more information (i.e., what does a repair status of "ok" mean for a record where barrier is "Yes"?)
- Scale accuracy of the data. is not identified.

14. Pursuant to 28 U.S.C. § 1746. I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this *13th* day of August 2006, at *Oakville*, Washington.

s/Ronald L. McFarlane
Ronald McFarlane

The Honorable Ricardo Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiff, v. STATE OF WASHINGTON, Defendant.	NO. C70-9213M Subproceeding No. 01-1 (CULVERTS) DECLARATION OF LOU BAKER

I, Lou Baker, declare as follows:

1. I am the Roadway Operations Supervisor for the Washington State Department of Transportation ("WSDOT"). I have held this position or its equivalent for four years and I have worked for the WSDOT as a Transportation Planning Specialist for a total of eight years. In all, I have worked for WSDOT since 1989. My duties include updating and distributing the State Highway Log Planning Report, updating the Roadway Classification Log, Horizontal and Vertical alignment Report and Road Life (Contract History) Report. I also supervise field and office personnel. The statements in this declaration are based on my personal knowledge.

2. A centerline line measures the length of a highway and does not take into consideration

the number of lanes. A one-mile length of four lanes measures the same as one-mile length of two lanes, etc. Both equal one centerline mile. A centerline mile is a linear measure of a State Route in 1/100th mile increments.

3. I have worked for 13 years updating the State Highway Log through contracts and field checks. The State Highway Log is a report which lists all State Routes from beginning to end in 1/100th mile increments and includes features on and along the route (number of lanes, roadway width, intersections, structures, traffic control, illumination, speed limit, special use lanes for example). A field check is physically inventorying a State Route, or section thereof, by driving the route in a vehicle equipped with a distance Measuring Instrument (DMI). A DMI is a highly calibrated odometer which is linked through a sensor to the transmission, which sends pulses to the DMI and the DMI reads out the mileage to 1/1000th of a mile (11100th for WSDOT purposes). Contracts give lengths in engineering stations, which are 100 feet. I calculate the number of stations in the contract area and then convert the length in feet to length in miles.

4. The following is a table containing the centerline miles of state highways from 1974 to present. Each year on the table is representative of the year on the State Highway Log cover, which until this year's publication (2005B) contained the totals of the prior year (i.e., 2003 Highway Log represented data thru 12/31/2002).

Year	Centerline Miles
1974	6912
1975	6906
1976	6916
1977	Unavailable
1978	6920
1979	6919
1980	6888
1981	6888
1982	6888
1983	6941
1984	6960
1985	6972
1986	6973
1987-89	Unavailable
1990	6996
1991(Pre RJT)	6998

Year	Centerline Miles
1991(Post RJT)	7012
1992	7020
1993	7048
1994	7047
1995	7052
1996	7053
1997	7059
1998	7066
1999	7063
2000	7061
2001	7061
2002	7063
2003	7063
2004	7049
2005	7046
2005B	7046

I declare under penalty of perjury that the foregoing is true and correct.

Dated this 1st day of September 2006.

s/Lou Baker
LOU BAKER

THE HONORABLE RICARDO S. MARTINEZ

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, vs. STATE OF WASHINGTON, at al., Defendants.	Case No.: C70-9213 Subproceeding No. 01-1 (Culverts) DECLARATION OF JOHN C. SLEDD IN SUPPORT OF PLAINTIFF-TRIBES' REPLY TO STATE OPPOSITION TO TRIBES' MOTION FOR SUMMARY JUDGMENT

I, John C. Sledd, hereby declare as follows:

1. I am an attorney and of counsel to the law firm of Kanji & Katzen, PLLC. I represent the undersigned Plaintiff-Intervenor tribes in this sub-proceeding. I make this declaration in that capacity.

2. Attached to this declaration at pages 3 through 13 are true and correct copies of selected pages of the Plaintiff-Intervenor Tribes' Answers and Responses to Washington's Third Discovery Requests in this Sub-proceeding.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Executed this 11th day of October, 2006, at Seattle, Washington.

s/ JOHN C. SLEDD
John C. Sledd, WSBA # 19270

[original page 1]

HONORABLE RICARDO S. MARTINEZ

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiff, v. STATE OF WASHINGTON, et al. Defendants.	Civil No. C70-9213 Sub-Proceeding No. 01-01 (Culverts) PLAINTIFF-INTERVENOR TRIBES' ANSWERS AND RESPONSES TO WASHINGTON'S THIRD DISCOVERY REQUESTS

TO: STATE OF WASHINGTON, Defendant

AND TO: FRONDA WOODS, Attorney of Record for Defendant

AND TO: STEVE E. DIETRICH, Attorney of Record for Defendant

AND TO: PHILIP M. FERESTER, Attorney of Record for Defendant

COME NOW, the Plaintiff-Intervenor Tribes, and answer and respond to Defendant State of Washington's Third discovery requests pursuant to Fed. R. Civ. P. 26, 29, 33 and 34, the corresponding Local Civil Rules for the United States District Court - Western District of Washington ("LCR"), and the proposed Scheduling Order for this subproceeding.

[original page 12]

NISQUALLY: No, not to the best of our knowledge. This answer applies to the

Nisqually Tribe's portion of the case area only.

PORT GAMBLE S'KLALLAM: Yes

JAMESTOWN S'KLALLAM: Several state-owned culverts and one state-owned dam have been identified to impact salmonid runs.

LOWER ELWHA KLALLAM: Culverts on all ownerships (federal, state, county, municipal and private) are a significant factor limiting salmon production within the Lower Elwha Tribes usual and accustomed area. Culverts generally do not result in outright fish kills, rather when they are blockages they act to reduce the overall freshwater productive capacity of some watersheds.

SAUK-SUIATTLE: No additional information beyond that provided by Skagit River System Cooperative.

NOOKSACK:

HOH: Yes.

MAKAH: Yes

SQUAXIN ISLAND:

SKOKOMISH:

QUINAULT:

YAKAMA:

INTERROGATORY NO. 82: If your answer to Interrogatory No. 81 is yes, please identify the

particular state-owned culvert or culverts and run involved, describe the nature of

[original page 13]

the destruction or threatened destruction, and please explain why you believe the culvert or culverts to be state-owned.

ANSWER: In addition to the tribe-specific responses provided below, we assume all culverts identified as state-owned barriers to fish passage by the WSDOT, WDFW, and WDNR in their respective ongoing culvert inventories are indeed state-owned and block fish passage and, therefore, threaten any fish runs whose waters of origin are located upstream from the culvert barrier, which attempts to migrate through any such culvert, or whose habitat is affected by any such culvert.

NWIFC:

SKAGIT RIVER SYSTEM COOPERATIVE:

POINT NO POINT TREATY COUNCIL: Not applicable.

LUMMI:

PUYALLUP: See response to Interrogatory No. 81. Again, the culvert under HWY SR 162, and all the other culverts running under SR highways, affects all runs of fish. The nature of the destruction or threatened destruction is blockage of fish passage. The culverts are state-owned because they run under SR's. (Note that the SR 99 culvert was fixed two years ago.)

SWINOMISH:

UPPER SKAGIT:

SUQUAMISH: SR 305 just southwest of Suquamish Way (WRIA 150296, fall chum & coho), SR 305 just northwest of Lemolo/Totten intersection (WRIA 150293, fall chum & coho), SR 305 between Delate Road and Stenbom Lane (WRIA 150291, fall chum & coho),

[original page 17]

addition to these structures, bridges and box culverts on Morse Creek, Bear Creek, and an unnamed tributary to the Pysht River are undersized resulting in habitat degradation. On lands owned by Washington DNR known blocking culverts have been identified on forest lands in the Twin River, Clallam River, and Salt Creek watersheds.

SAUK-SUIATTLE: No additional information beyond that provided by Skagit River System Cooperative.

NOOKSACK:

HOH: Lost Creek Box Culvert (WRIA # 20.0440) under Highway 101 which existed as a concrete box culvert from about 1931 to 1999. In 1999 the culvert was replaced by a bridge that restored coho and steelhead access to above the highway.

MAKAH: Brownes Creek, a tributary to the Hoko River (Straits of Juan de Fuca), was severely impacted during winter 1999 by a debris flow and subsequent culvert failure at a lower State road crossing. Floodwater and debris from upstream (Crown Pacific Land) clogged a State Owned (DNR) culvert on the 5000 Road on DNR property. The culvert was located under 45 to 50 feet of fill and was

approximately 7 feet in diameter. No additional water relief culverts were present within the deep fill. Stream gradient along this section of Brownes Creek varies between 4 and 20%. The culvert was undersized to pass the 100-year flow, sediment, and wood transport, but was especially undersized to pass debris flow material in a landslide prone area within commercial tree farms.

[original page 18]

After the culvert plugged during the storm event, the area behind the culvert filled with water, sediment and debris to an approximate volume of 500,000 ft^3. Initially, this pounded water behind the blocked culvert and fill dam began pour over the 45-50 foot fill surface like a waterfall. However, soon after, the culvert and road fill failed, similar to a dam break event, sending a wall of water scouring downstream. The water height of this event decreased downstream from an initial height of 40 feet to 10 to 15 feet at the confluence of Brownes Creek with the Hoko River.

This debris flow significantly affected local fish populations in both Brownes Creek and the Hoko River. Brownes Creek contains runs of Chinook and Coho Salmon and Steelhead and Cutthroat Trout. The Hoko River additionally contains runs of Chum Salmon. Both Chinook and Chum salmon in the Hoko River Watersheds are "depressed" at low levels. Most if not all salmonids present in Brownes Creek during the culvert failure were killed, inducing adults, juveniles, and eggs. Dead fish were visible. Due to the dramatic changes in channel configuration, channel instability, fine sediment deposition, wood load, and

overall habitat integrity, Brownes Creek and the area downstream along the Hoko River have struggled to produce healthy numbers of salmon post-impact. This situation continues to this day, but recovery is occurring slowly.

The State of Washington and DNR provided no initial help or responsibility for mitigating this severe impact on fish habitat. The culvert crossing was never replaced, but some of the remaining culvert fill was pulled back out of the stream crossing. Inactions by other stakeholders to mitigate the impacts or restore the channel, lead the Makah Tribe to

[original page 19]

search for funding to restore this important public and Tribal resource, Brownes Creek. Using both Federal and State (SRFB) salmon funding and subsequent cooperation effort from Crown Pacific, the Makah Tribe initiated a rehabilitation project during Summer 2003. See question 132.

SQUAXIN ISLAND:

SKOKOMISH:

QUINAULT:

YAKAMA:

REQUEST FOR PRODUCTION NO. 46: If your answer to Interrogatory No. 81 is yes, please produce all documents supporting your contention.

ANSWER: Culvert inventories and accompanying culvert data developed by the WSDOT, WDFW, and WDNR are already in the State's possession.

NWIFC:

SKAGIT RIVER SYSTEM COOPERATIVE:

POINT NO POINT TREATY COUNCIL: We are unaware of any such documents.

LUMMI:

PUYALLUP: Please refer to previous responses. We have no other documentation at this time but will obtain photos and visual description of the SR 162 culvert when water levels and fish presence permit photographic depiction.

[original page 46]

obtain fish for ceremonial and subsistence needs, including the opportunity to obtain fish for these purposes from traditional sources or through traditional methods.

INTERROGATORY NO. 108: If your answer to Interrogatory No. 107 is yes, please identify the culvert or culvert, Tribe or Tribe, and ceremonial or subsistence fishery involved, and please explain why you believe the culvert or culverts to be state-owned.

ANSWER: N/A.

INTERROGATORY NO. 109: Do you have any evidence of actual fish killed at or as a result of a state-owned culvert? If the answer is yes, please identify the exact location of the fish kill, including stream, WRIA number, and river mile. Please explain why you believe the culvert to be a state-owned culvert.

ANSWER:

NWIFC:

SKAGIT RIVER SYSTEM COOPERATIVE: Yes we have evidence of fish kill. Red Cabin Creek at Highway 20, Tributary to the Skagit River in WRIA 3, river mile unknown, near the town of Hamilton. We believe the culvert is state owned because it is under State Highway 20.

POINT NO POINT TREATY COUNCIL: No.

LUMMI:

[original page 47]

PUYALLUP: No, not in the sense of physical evidence, post-mortem or necropsy documents, "smoking gun" photos, etc.

SWINOMISH: No additional information beyond that supplied by the Skagit River System Cooperative (formerly Skagit System Cooperative) in its responses to this Interrogatory.

UPPER SKAGIT:

SUQUAMISH: Yes. SR 305 just SW of Johnson Road crossing, WRIA 150290 (Bjorgen creek) RM 0.4 has been the scene of fish killed at a State-owned culvert. Dead chum and coho salmon have been observed at the downstream end of this culvert during annual spawner ground survey work conducted by Suquamish Fisheries staff.

STILLAGUAMISH:

NISQUALLY: No.

PORT GAMBLE S'KLALLAM: Yes. As a result of stream channel drying and isolation of juvenile coho from upstream perennial habitat in Marple Creek by a State-owned culvert, there has been direct mortality

of salmon. Please see the answer to Interrogatory No. 82. Marple Creek lies in WRIA 17, and the State Highway 101 crossing lies at 20 approximately RM 0.2. This event occurs each year that the stream dries below Highway 101. Often, when stream drying is not complete, piscivorous birds and raccoons will easily prey on juvenile coho isolated in individual pools by stream drying.

JAMESTOWN S'KLALLAM: No.

[original page 48]

LOWER ELWHA KLALLAM: Culverts do not generally result in fish kills, rather they limit the ability of fish to complete their life histories and may result in reductions in fish production within certain watersheds. The Brownes Creek culvert failure discussed in Interrogatory number 83 is an example of a catastrophic culvert failure.

SAUK-SUIATTLE: No additional information beyond that provided by Skagit River System Cooperative.

NOOKSACK:

HOH: No state owned culverts have been assessed by the state or Hoh Tribe as being the direct cause of debris flows killing fish or incubating eggs nor had we witnessed fish mortalities at the Lost Creek culvert perched outfall.

MAKAH: See # 82 above.

SQUAXIN ISLAND:

SKOKOMISH:

QUINAULT:

YAKAMA:

INTERROGATORY NO. 110: For each of the plaintiff-intervenor Tribes, please state, for each year from 1995 forward, the Tribal government's total dollar expenditures, including expenditures for business enterprises owned by the Tribe.

ANSWER: Objection. This Interrogatory is not reasonably calculated to discover relevant evidence and is vague, ambiguous, and overbroad. Many Tribal governmental

[original page 118]

ANSWERS AND RESPONSES dated this 27th day of May, 2005.

RAAS, JOHNSEN & STUEN, P.S.
OFFICE OF SPECIAL COUNSEL

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Tribal Coordinating Counsel

MORISSET SCHLOSSER AYER et al.

MASON D. MORISSET, WSBA #273
Counsel for the Tulalip Tribe
Tribal Coordinating Counsel

VERIFICATION

The undersigned, as Tribal Coordinating Counsel, and attorney for Plaintiff Tribe, Lummi Indian Nation, certifies to the best of his knowledge, information and belief, formed after a reasonable inquiry that the responses and objections are: (1) consistent with the Federal Rules of Civil Procedure and warranted by existing law or a good faith argument for the extension, modification or reversal of existing law; (2) not interposed for any improper purpose, such as to harass or to cause unnecessary delay or needless increase in the cost of litigation; and (3) not unreasonable or unduly burdensome or expensive, given the needs of the case, the discovery already in the case, the amount in controversy and the importance of the issues at stake in the litigation.

DATED this 27th day of May, 2005.

KANJI & KATZEN, PLLC

PHILLIP E. KATZEN, WSBA #7835
Co-Counsel for the Hoh, Suquamish, Jamestown, Lower Elwha, Pt. Gamble Bands of S'Klallams, Nisqually, Nooksack, Sauk-Suiattle, Skokomish, Squaxin Island, Stillagaumish, and Upper Skagit Tribes Tribal Coordinating Counsel

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The Honorable Ricardo Martinez

UNITED STATES DISTRICT COURT WESTERN DISTRICT OF WASHINGTON AT SEATTLE

UNITED STATES OF AMERICA, et.al. Plaintiff, vs. STATE OF WASHINGTON, Defendant	Case No.: C70-9213 M Subproceeding No. 01-1 (CULVERTS) STIPULATION RE: TREATY AND NON-TREATY HARVEST DATA

This Stipulation sets forth the parties' agreement regarding the use of three tables and fourteen figures for use as joint exhibits in this Subproceeding. This Joint Stipulation has been prepared, reviewed, and stipulated to by the parties for the sole purpose of presenting certain basic fisheries harvest data for use only in *United States v. Washington*, Case No. C70-9213 M, Subproceeding No. 01-1 (Culverts), U.S. District Court, Western District of Washington. Accordingly, these exhibits are limited to fisheries data available at the time of this sub-proceeding and are subject to revision.

TREATY HARVESTS 1974-2007 and TREATY/ NON-TREATY HARVESTS 1974-2003

Attached hereto and incorporated herein by this reference are true and correct copies of Tables 1-3 and Figures 1-14 summarizing Treaty and Non-Treaty harvest data. Table 1 summarizes tribal

harvest in each of the years 1974 through 2007 in the United States v. Washington case area (ocean, coastal rivers,[1] Puget Sound, and Puget Sound rivers combined), and in the Willapa Bay watershed. Tribal harvest data is listed separately for each species Chinook, Chum, Pink, Coho, Sockeye, and Steelhead). Table 1 also provides an all species total for each year. Figures 1-7 were also prepared to correspond to the data shown in Table 1. Table 2 and graphs corresponding to the data in that table (Figures 8-14) show combined treaty and non-treaty commercial and sport harvests for all salmonid species from 1974-2003. Table 3 provides treaty catch of US origin versus Canadian sockeye stocks in Puget Sound determined by applying an assumed percentage to total catch for each year. For Canadian origin stocks, the assumed percentage was determined by totaling the treaty sockeye landings in pre-terminal areas (4B, 5, 6, 6C, 7, 7A, and 9) and dividing by the total.

SOURCE OF DATA

Treaty and non-treaty commercial data in the attached Tables 1-3 were obtained from the Washington Department of Fish and Wildlife (WDFW) Commercial Licensing/Fish Ticket System (LIFT). The LIFT database is compiled by the

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[1] The *United States v. Washington* "case area" includes Washington watersheds that drain into Puget Sound, Grays Harbor, and the Pacific Ocean north of Grays Harbor. *United States v. Washington*, 384 F. Supp. 312, 328 (W.D. Wash. 1974); *United States v. Washington*, 459 F. Supp. 1020, 1097 (W.D. Wash. 1977). The Willapa Bay watershed is not within the case area.

WDFW in its regular course of business and is also maintained by the Quantitative Services Division of the Northwest Indian Fisheries Commission in its Treaty On-line Catch Accounting System (TOCAS). For the sport catch, the data was compiled from the WDFW Sport Catch database that is maintained by WDFW in its regular course of business. Information from the LIFT and Sport Catch databases is obtained routinely by state and tribal fisheries managers and scientists on an ongoing basis for fisheries management. The parties stipulate that the compilations contained in each of these tables and figures are true, accurate, and complete.

WDFW obtains the LIFT information from fish receiving tickets ("fish tickets"). The fish tickets used by both treaty and non-treaty fishers are used to record their catch in Washington State. Fish ticket contents for Treaty and non-Treaty fishers are defined by Ch. 220-69 of the Washington Administrative Code. The fish ticket must show the name or ID number of the fisher and fish buyer, date of landing, catch area, the individual number and total weight of each species caught, and other specific information. Treaty and non-Treaty fish ticket data are collected by WDFW and are routinely used by state, tribal, and federal regulators to manage fisheries. For example, fish ticket data are basic inputs for computer models used by state, tribal, and federal regulators to estimate the size of fish populations, to determine maximum allowable harvests, and to decide when any specific fishery must be closed to prevent over-harvest.

The Sport Catch database is derived from sport catch estimates provided by catch record cards, angler

surveys, and other methods of estimating sport catch in various locations and seasons throughout the state. This database is recognized by the State to be the best source of sport catch accounting that is currently available for the state of Washington and is routinely utilized by State, tribal, and federal fisheries managers and scientists.

Combined treaty and non-treaty sport and commercial harvest data of salmon and steelhead in the United States v. Washington Case Area and the Willapa Bay watershed include the following areas: Ocean, Coastal Rivers, Puget Sound and Puget Sound rivers from 1974-2003. Commercial catch includes ceremonial and subsistence catch but not test fisheries. Table 2, which includes sports catch, only goes to 2003 because 2004 and later sport catch estimates are considered preliminary by state fisheries managers and are subject to annual revisions.

The data and methods used in preparing the aforementioned tables and figures are what scientists would reasonably utilize and rely upon in fisheries management.

Signed this 24th day of September, 2009.

Presented by:

By: JOHN C. SLEDD, WSBA # 19270
(by SJS per phone / email authorization)
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By: /s/ SAMUEL J. STILTNER, WSBA # 7765
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THE STATE OF WASHINGTON, et al., Defendants

By: FRONDA WOODS,WSBA # 18728
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Assistant Attorney General
Washington Attorney General's Office

THE UNITED STATES OF AMERICA

By: PETER C. MONSON
United States Department of Justice
(by SJS per phone / email authorization)

CERTIFICATE OF SERVICE

I hereby certify that on September 24, 2009, I electronically filed the foregoing with the Clerk of the Court using the CM/ECF system which will send notification of such filing to the parties required to be served in this subproceeding whose names appear on the official service list as registered in the Court CM/ECF system.

By: s/Samuel J. Stiltner
WSBA: # 7765

Table 1

Tribal harvest of salmon and steelhead in western and Puget Sound Rivers)				
YEAR	CHINOOK	CHUM	PINK	COHO
1974	91,006	173,059	25	463,647
1975	126,854	79,427	105,164	442,662
1976	156,710	298,652	42	341,618
1977	147,927	182,524	180,136	468,003
1978	163,525	503,599	74	469,006
1979	141,292	103,769	760,071	541,711
1980	191,021	465,746	332	889,663
1981	179,168	285,629	1,177,398	547,963
1982	180,574	473,382	78	930,687
1983	168,619	279,545	820,343	637,242
1984	181,452	403,509	68	582,857
1985	197,212	554,309	2,177,039	848,482
1986	178,692	663,659	113	1,023,625
1987	215,103	720,804	1,117,032	1,283,953
1988	239,931	889,485	67	880,889
1989	272,212	521,221	1,850,177	737,879
1990	249,115	570,984	301	806,175
1991	161,514	562,781	1,712,768	597,096
1992	132,372	778,892	121	399,307
1993	108,261	544,616	1,118,774	251,772
1994	89,067	793,891	214	450,734
1995	97,655	381,117	1,344,707	368,125
1996	95,080	260,790	54	263,320
1997	83,019	189,636	1,008,435	157,898
1998	73,023	318,678	515	188,857
1999	120,097	119,160	51,934	192,417
2000	84,230	156,069	349	446,770

Table 1

Washington (Ocean, Coastal Rivers, Puget Sound from 1974-2007.			
SOCKEYE	STEELEHEAD		TOTAL
58,984	4,885		791,572
133,657	0	*	887,764
110,492	12,066		919,580
396,125	14,386		1,389,101
256,253	17,734		1,410,191
429,004	15,089		1,990,936
284,757	20,696		1,852,215
569,880	22,729		2,782,767
1,407,535	24,771		3,017,027
219,993	25,437		2,151,179
851,099	1,744		2,020,729
1,574,557	25,996		5,377,595
1,357,347	93,618		3,317,054
997,568	80,968		4,415,428
519,377	82,275		2,612,024
1,126,586	47,363		4,555,438
1,193,441	47,121		2,867,137
849,898	32,220		3,916,277
300,665	58,405		1,699,762
1,397,235	31,180		3,451,838
960,166	30,013		2,324,085
243,350	31,072		2,466,026
287,262	30,467		936,973
680,717	21,369		2,141,074
311,621	39,578		932,272
20,694	24,674		528,976
320,390	26,226		1,034,034

YEAR	CHINOOK	CHUM	PINK	COHO
2001	147,550	752,144	319,279	501,374
2002	150,522	839,450	277	387,861
2003	130,664	786,594	551,798	312,432
2004	166,327	929,308	699	653,737
2005	141,595	348,376	240,525	432,485
2006	148,072	764,032	368	325,596
2007	150,941	802,513	315,311	278,945
	CHINOOK	CHUM	PINK	COHO
Total	5,160,402	16,497,316	14,854,588	18,104,788

SOCKEYE	STEELEHEAD		TOTAL
170,408	38,847		1,929,602
356,883	23,292		1,758,285
220,617	23,280		2,025,485
149,640	32,056		1,931,767
141,038	28,598		1,332,617
541,322	26,261		1,805,651
5,494	30,937		1,584,141
SOCKEYE	STEELEHEAD		TOTAL
18,444,055	1,065,454		74,126,602

Table 2. Combined treaty and harvest of salmon and steelhead

Year	Chinook	Chum	Pink	Coho
1974	913,602	462,444	1,238	2,549,666
1975	989,386	213,915	1,421,505	2,291,454
1976	1,043,705	825,348	2,006	2,894,444
1977	859,266	472,636	2,367,132	2,178,130
1978	737,079	1,293,591	1,791	1,910,228
1979	706,153	127,386	4,798,855	1,924,361
1980	702,906	1,013,373	1,061	2,048,024
1981	594,642	539,696	4,170,967	1,508,231
1982	613,397	1,114,581	198	1,992,064
1983	506,034	563,531	1,964,556	1,421,980
1984	456,012	782,471	155	1,143,208
1985	486,288	1,139,368	4,334,788	1,722,685
1986	487,278	1,229,457	169	2,102,617
1987	497,554	1,421,891	2,130,652	2,434,595
1988	541,131	1,787,225	196	1,669,579
1989	601,939	913,844	3,549,140	1,600,387
1990	561,095	1,108,503	775	1,842,303
1991	398,973	1,098,512	3,395,166	1,464,164
1992	395,784	1,519,972	692	839,803
1993	346,044	1,166,521	2,200,800	572,608
1994	194,587	1,373,922	257	531,884
1995	218,871	764,192	2,844,973	608,813
1996	228,959	814,559	109	497,194
1997	200,530	430,656	1,930,980	344,022
1998	141,422	852,712	1,071	363,051
1999	196,819	261,118	90,383	278,442
2000	160,029	311,546	446	637,912
2001	273,197	1,619,791	1,022,066	955,396
2002	329,346	2,017,876	534	631,026
2003	274,840	1,604,562	1,499,998	635,927
Total	**14,656,868**	**28,845,199**	**37,732,659**	**41,594,198**

non-treaty sport and commercial
in western Washington.

Sockeye	Steel-head	Other	Jacks	Un-known	Salmon and Steelhead
2,520,066	59,949	3,343	9,195	0	6,519,503
1,675,446	30,005	244	12,169	0	6,634,124
1,317,346	44,176	981	14,218	0	6,142,224
1,885,160	86,204	1,165	9,944	0	7,859,637
1,388,854	74,356	1,252	12,025	0	5,419,176
1,797,991	84,146	824	10,003	226	9,449,945
594,533	73,967	454	8,652	189	4,443,159
1,316,997	68,466	617	7,906	240	8,207,762
2,876,640	67,088	16,443	6,948	159	6,687,518
398,350	73,258	26,776	13,528	483	4,968,496
1,700,355	86,994	46,120	10,379	856	4,226,550
2,942,290	82,456	4,207	8,986	0	10,721,068
2,737,831	154,837	4,175	8,624	44	6,725,032
1,963,584	134,313	7,752	9,137	313	8,599,791
857,240	129,082	80,014	0	2,747	5,067,214
2,241,557	87,962	6,433	0	1,617	9,002,879
2,168,579	72,291	0	0	2,605	5,756,151
1,826,983	71,833	0	0	1,830	8,257,461
618,894	102,953	0	0	1,432	3,479,530
2,730,185	59,649	0	0	1,172	7,076,979
1,839,074	71,356	0	0	1,377	4,012,457
406,723	61,999	0	0	708	4,906,279
390,404	62,628	0	0	1,703	1,995,556
1,365,531	37,626	0	0	574	4,309,919
540,721	65,158	0	0	1,242	1,965,377
20,870	51,640	0	3	301	899,576
613,750	57,289	0	0	161	1,781,133
255,985	88,982	0	0	212	4,215,629
534,898	50,623	0	0	1,909	3,566,212
311,607	59,302	0	0	262	4,386,498
41,838,444	**2,250,588**	**200,800**	**141,717**	**22,362**	**167,282,835**

Table 3

Presumed Tribal harvest of sockeye salmon in western Washington (Ocean, Coastal Rivers, Puget Sound and Puget Sound Rivers) from 1979-2005				
Year	Total Tribal Sockeye Harvest	Tribal Sockeye Harvest Presumed to be of Canadian Origin[1]	Tribal Sockeye Harvest Presumed to be of US Origin[2]	% of Tribal Sockeye Harvest Presumed to be of Canadian Origin
1979	429,004	392,106	36,898	91.40%
1980	284,757	191,487	93,270	67.25%
1981	569,880	537,713	32,167	94.36%
1982	1,407,535	1,369,176	38,359	97.27%
1983	219,993	186,434	33,559	84.75%
1984	851,099	789,625	61,474	92.78%
1985	1,574,557	1,539,197	35,360	97.75%
1986	1,357,347	1,348,343	9,004	99.34%
1987	997,568	959,925	37,643	96.23%
1988	519,377	371,951	147,426	71.61%
1989	1,126,586	1,118,007	8,579	99.24%
1990	1,193,441	1,175,911	17,530	98.53%
1991	849,898	838,033	11,865	98.60%
1992	300,665	289,401	11,264	96.25%
1993	1,397,235	1,361,993	35,242	97.48%
1994	960,166	955,767	4,399	99.54%
1995	243,350	241,907	1,443	99.41%
1996	287,262	222,992	64,270	77.63%
1997	680,717	675,487	5,230	99.23%
1998	311,621	305,909	5,712	98.17%
1999	20,694	20,215	479	97.69%

Year	Total Tribal Sockeye Harvest	Tribal Sockeye Harvest Presumed to be of Canadian Origin[1]	Tribal Sockeye Harvest Presumed to be of US Origin[2]	% of Tribal Sockeye Harvest Presumed to be of Canadian Origin
2000	320,390	258,788	61,602	80.77%
2001	170,408	162,680	7,728	95.47%
2002	356,883	299,261	57,622	83.85%
2003	220,617	177,751	42,866	80.57%
2004	149,640	111,733	37,907	74.67%
2005	141,038	137,688	3,350	97.62%

[1] Stocks in this category are predominantly Fraser River stocks that are of Canadian origin. This category is known to include a small amount of intermingled US origin (Baker River, Lake Washington, Misc.) stocks but their numbers are considered minor in comparison.

[2] Stocks in this category are predominantly Lake Washington. There are other minor US origin stocks that may not be accounted for in this table.

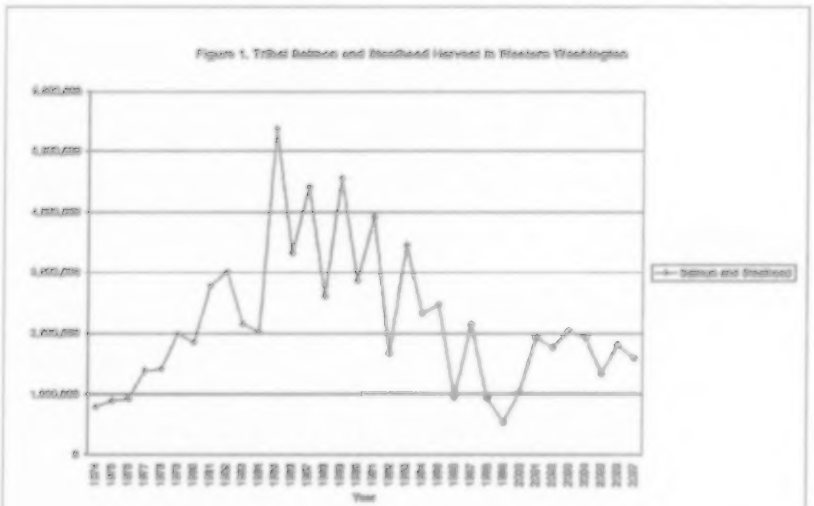


Figure 1. Tribal Salmon and Steelhead Harvest in Western Washington
Salmon and Steelhead
Year

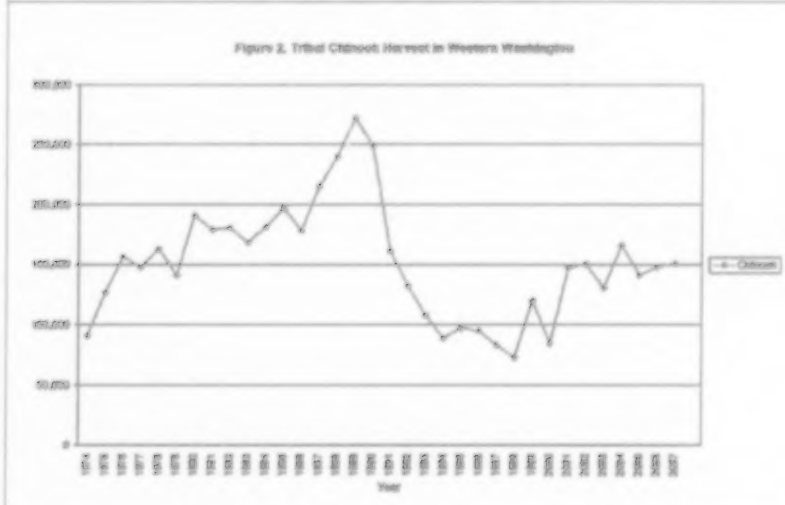
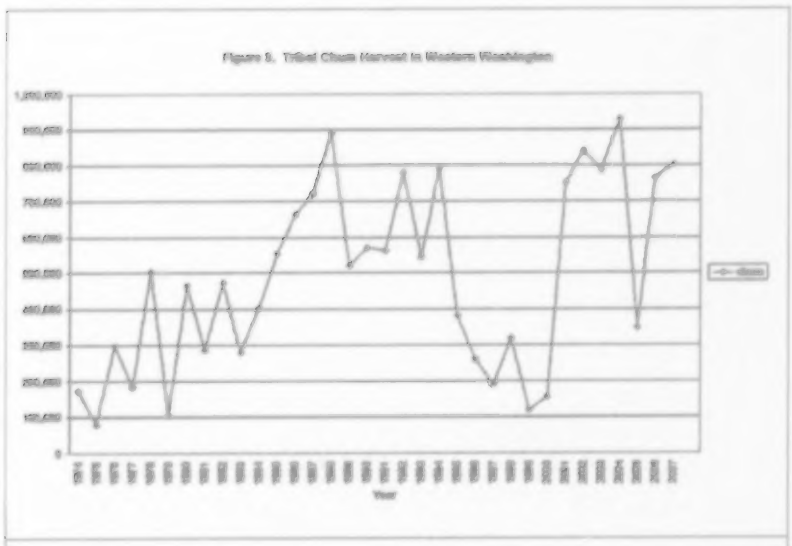


Figure 2. Tribal Chinook Harvest in Western Washington
Chinook
Year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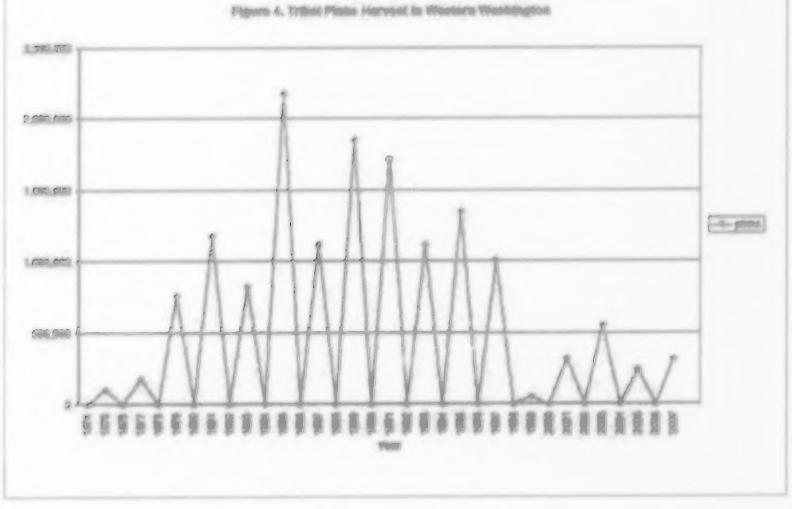
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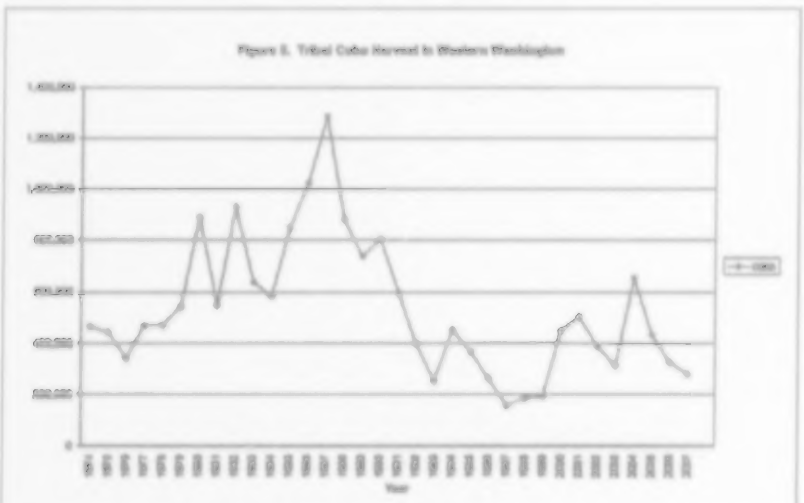
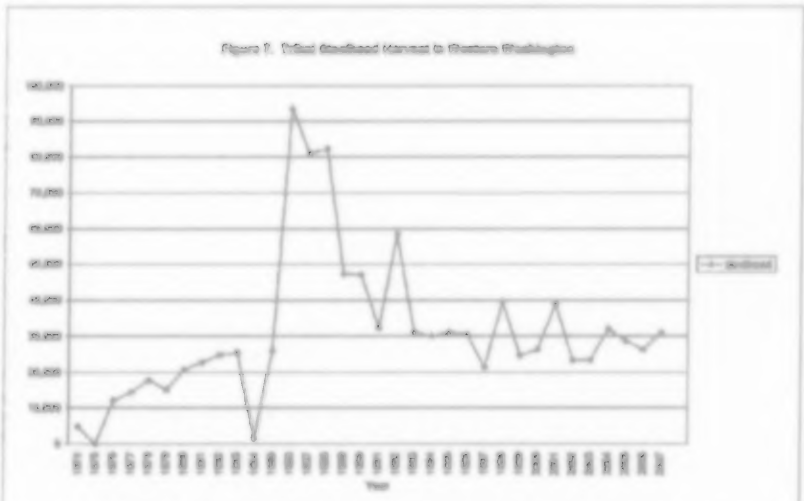
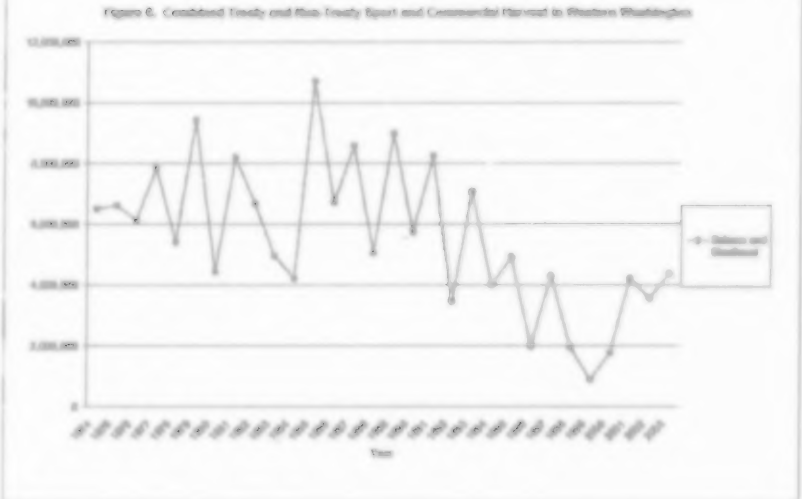
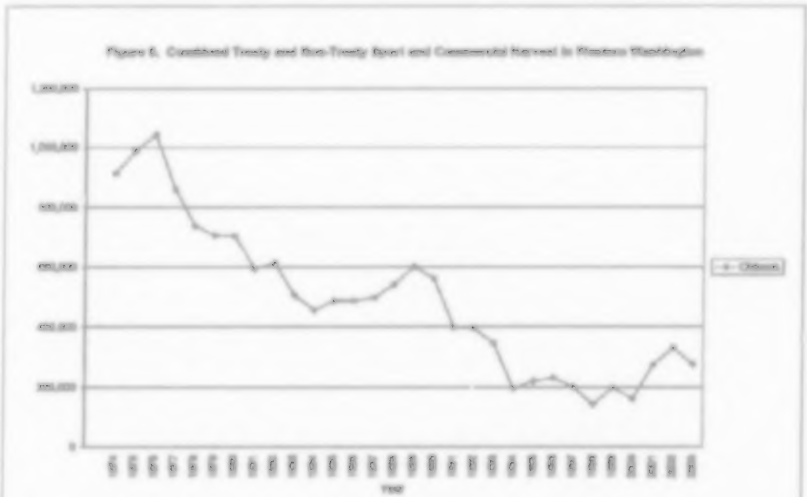
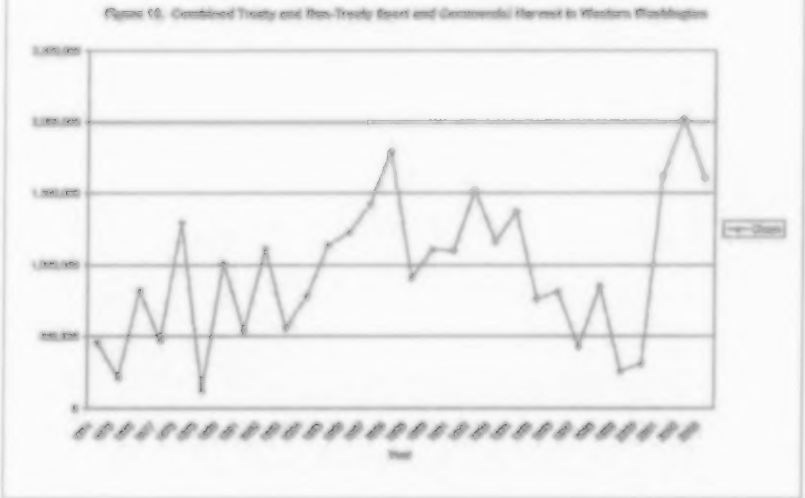










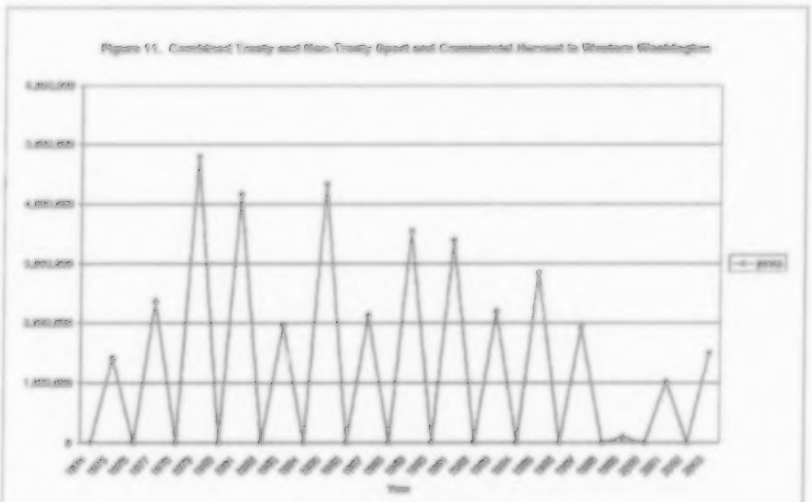


Figure 11. Combined Treaty and Non-Treaty Sport and Commercial Harvest in Western Washington

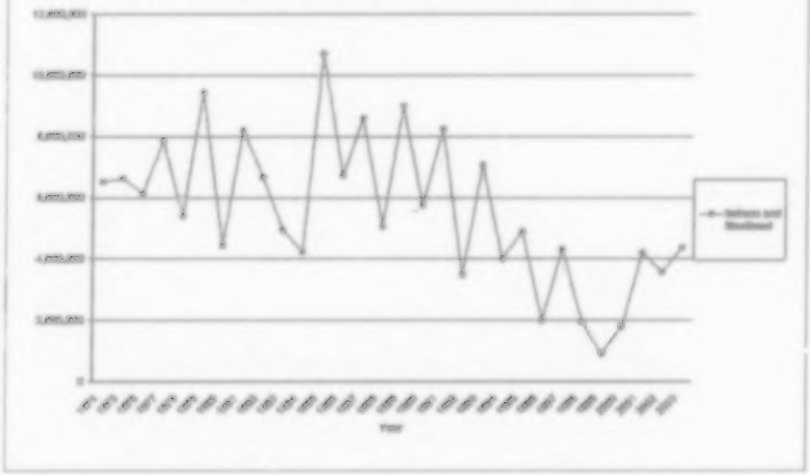


Figure 6. Combined Treaty and Non-Treaty Sport and Commercial Harvest in Western Washington

Figure 13. Combined Treaty and Non-Treaty Sport and Commercial Harvest in Eastern Washington

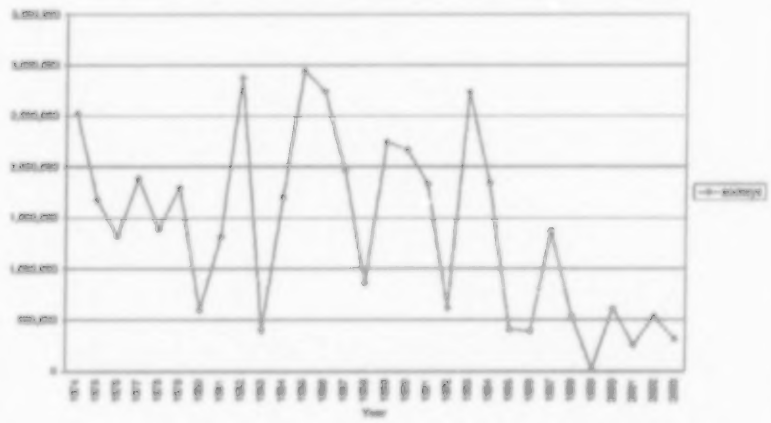
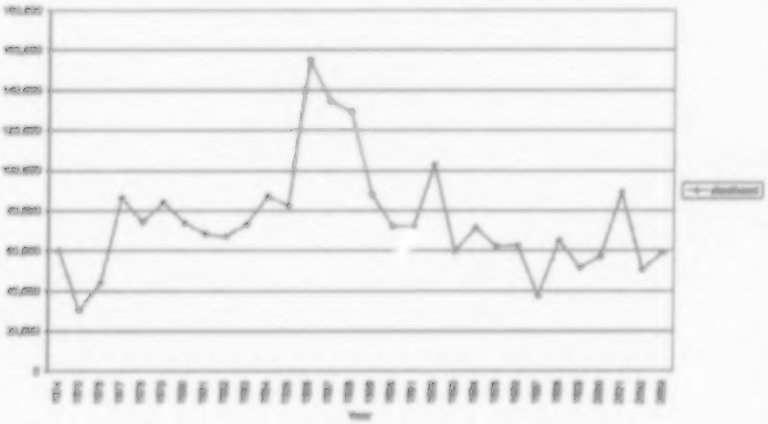


Figure 14. Combined Treaty and Non-Treaty Sport and Commercial Harvest in Western Washington



The Honorable Ricardo Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, et al., Defendants.	CASE NO. CV 9213RSM Subproceeding No. 01-1 DECLARATION OF YVONNE M. MARSH

I, Yvonne M. Marsh declare as follows:

1. I am a Paralegal Specialist for the United States Department of Justice, Environment and Natural Resources Division, Indian Resources Section. I have been employed with the Federal Government since 1981 and have been with the Indian Resources Section since approximately 1993. I have been assigned to work in the *United States v. Washington*, Culverts Subproceeding and to assist attorney, Peter Monson, in the *United States v. Washington* cases.

2. This declaration attaches and authenticates certain documents that the United States relies upon in its supplemental brief.

3. The documents obtained (and their current Internet addresses) are as follows:

a. Exhibit 1 is a true and correct copy of the cover page and pages 151, 176, and 231 of *the Status Review Update for Pacific Salmon and Steelhead Listed Under the Endangered Species Act — Pacific Northwest* (NMFS 2010), available on NOAA's website at http://www.nwr.noaa.gov/Publications/Biological-Status-Reviews/upload/SR-2010-all-species.pdf.

b. Exhibit 2 is a true and correct copy of the cover page and pages 1:3 and 3:8 of the *Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual* (WDFW 2009), available on WDFW's website at http://www.wdfw.wa.gov/publications/00061/wdfw00061.pdf.

c. Exhibit 3 is a true and correct copy of pages 7:2 and 7:3 of the *WSDOT Hydraulics Manual* (WSDOT 2010), available on WSDOT's website at http://www.wsdot.wa.gov/publications/manuals/fulltext/M23-03/Chapter7.pdf.

d. Exhibit 4 is a true and correct copy of pages 42 and 43 of the *Fish Passage Barrier Inventory Progress Performance Report* (DOT/DFW 2012), which is available on WSDOT's website at http://www.wsdot.wa.gov/NR/rdonlyres/EBE727F4-30DF-4C12-A9A3-30FB5D897EC5/0/2012FishPassRpt.pdf.

e. Exhibit 5 is a true and correct copy of pages A:42, A:44, and A:46 of the *Finding of No Significant Impact 1-405 Bellevue to Lynnwood* Improvement Project (Federal Highway Administration 2011), available on WSDOT's website at . . . *[sic . . . just ended]*

[Original page 1]

Status review update for Pacific salmon and steelhead listed under the Endangered Species Act

Pacific Northwest[1]

Michael Ford (ed.), Tom Cooney, Paul McElhany, Norma Sands, Laurie Weitkamp, Jeffrey Hard, Michelle McClure, Robert Kope, Jim Myers, Andrew Albaugh, Katie Barnas, David Teel, Paul Moran and Jeff Cowen*

Northwest Fisheries Science Center
Conservation Biology Division
*Operations, Management and Information Division

December 10, 2010

Cite as: Ford MJ (ed.), Cooney T, McElhany P, Sands N, Weitkamp L, Hard J, McClure M, Kope R, Myers J, Albaugh A, Barnas K, Teel D, Moran P, Cowen J. 2010. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Northwest. Draft U.S. Department of Commerce, NOAA Technical Memorandum NOAA-TM-NWFSC-XXX.

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[1] An equivalent report for California is available: Williams, T.H., S.T. Lindley, B.C. Spence, and D.A. Boughton. Draft (December 2010). Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Southwest. Draft U.S. Department of Commerce, NOAA Technical Memorandum NOAA-TM-SWFSC-XXX.

[Original page 151]

Puget Sound Chinook salmon: Updated Risk Summary

All Puget Sound Chinook populations are well below the TRT planning range for recovery escapement levels. Most populations are also consistently below the spawner-recruit levels identified by the TRT as consistent with recovery. Across the ESU, most populations have declined in abundance somewhat since the last status review in 2005, and trends since 1995 are mostly flat. Several of the risk factors identified by Good et al. (2005) are also still present, including high fractions of hatchery fish in many populations and widespread loss and degradation of habitat. Many of the habitat and hatchery actions identified in the Puget Sound Chinook recovery plan are expected to take years or decades to be implemented and to produce significant improvements in natural population attributes, and these trends are consistent with these expectations. Overall, the new information on abundance, productivity, spatial structure and diversity since the 2005 review does not indicate a change in the biological risk category since the time of the last BRT status review.

References

Good TP, Waples RS, Adams P (2005) Updated status of federally listed ESUs of West Coast salmon and steelhead. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-66., p. 598.

Myers, J. M., R. G. Kope, G. J. Bryant, D. J. Teel, L. J. Lierheimer, T. C. Wainwright, W. S. Grant, F. W. Waknitz, K. Neely, S. Lindley, R. S. Waples.

1998. Status review of Chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dept. of Commerce, NOAA Tech. Memo., NMFS-NWFSC-35, 443 p.

Puget Sound Technical Recovery Team (PSTRT). April 30, 2002. Planning ranges and preliminary guidelines for the delisting and recovery of the Puget Sound Chinook Salmon Evolutionarily Significant Unit. http://www.nwfsc.noaa.gov/trt/Puget_docs/trtpopesu.pdf 20pp.

Ruckelshaus, M.H., K.P. Currens, W.H. Graeber, R.R. Fuerstenberg, K. Rawson, N.J. Sands, and J.B. Scott. 2006. Independent populations of Chinook salmon in Puget Sound. NOAA Technical Memorandum NMFS-NWFSC-78. 145pp.

Sands, N. J. 2009. A user's guide to the abundance and productivity (A & P) tables as developed for Puget Sound Salmon. From the Puget Sound Technical Recovery Team (PSTRT) Abundance and Productivity (A & P) Workgroup. Fourth draft, 20 April, 2009. (Available from N. J. Sands, Northwest Fisheries Science Center, 2725 Montlake Blvd. E., Seattle, WA 98112.)

Sands, N. J. 2007. Estimating missing age data for Pacific salmon cohort run reconstruction using the "age engine." Draft, 28 September, 2007. (Available from N. J. Sands, Northwest Fisheries Science Center, 2725 Montlake Blvd. E., Seattle, WA 98112.)

Shared Strategy 2007. Puget Sound Recovery Plan. Adopted by NMFS January 19, 2007. http://www.nwr.noaa.gov/Salmon-Recovery-Plann

ing/Recovery-Domains/PugetSound/PS-Recovery-Plan.cfm

[Original page 176]

Hood Canal summer chum salmon: Updated Risk Summary

The spawning abundance of this ESU has clearly increased since the time of listing, although the recent abundance is down from the previous 5-years. While spawning abundances have remained relatively high compared to the low levels in the early 1990's, productivity has decreased significantly for the last 5 brood years, being lower for brood years 2002-2006 than any previous 5-year average since 1971. This is a concern for future production. Since abundance is increasing and productivity is decreasing, this suggests that improvements in habitat and ecosystem function is needed. Diversity is increasing from the low values seen in the 1990s due both to the reintroduction of spawning aggregates and the the *[sic]* more uniform relative abundance between populations; this is a good sign for viability in terms of spatial structure and diversity. Spawning survey data shows that the spawning distribution within most streams has been extended further upstream as abundance has increased (WDFW and PNPTT 2007. Overall, the new information considered does not indicate a change in the biological risk category since the time of the last BRT status review.

References

Good TP, Waples RS, Adams P (2005) Updated status of federally listed ESUs of West Coast salmon and steelhead. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-66., p. 598.

Hood Canal Coordinating Council. 2007. Hood Canal & Eastern Strait of Juan de Fuca Summer Chum Salmon Recovery Plan. Adopted by NMFS May 24, 2007. http:/ fwww.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/HC-Recovery-Plan.cfm

Johnson, O. W., W. S. Grant, R. G. Kope, K. Neely, F. W. Waknitz, and R. S. Waples. 1997. Status review of chum salmon from Washington, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-32.

Sands, N.J. 2009. A user's guide to the abundance and productivity (A & P) tables as developed for Puget Sound Salmon. From the Puget Sound Technical Recovery Team (PS TRT) Abundance and Productivity (A & P) Workgroup. Fourth draft, 20 April, 2009. (Available from N. J. Sands, Northwest Fisheries Science Center, 2725 Montlake Blvd. E., Seattle, WA 98112.)

Sands, N.J. K. Rawson, K.P. Currens, W.H. Graeber, M.H. Ruckelshaus, R.R. Fuerstenberg,4 *[sic]* and J.B. Scott. 2009. Determination of Independent Populations and viability Criteria for the Hood Canal summer Chum salmon Evolutionarily Significant Unit. NOAA Technical Memorandum NMFS-NWFSC-101. 71 pp.

Washington Department of Fish and Wildlife and Point No Point Treaty Tribes (WDFW and PNPTT). 2000. Summer Chum Salmon Conservation Initiative. Washington Department of Fish and Wildlife and Point No Point Treaty Tribes, Olympia, WA. 423 pages + appendices. Available at http://wdfw.wa.gov/fish/chum/library/

Washington Department of Fish and Wildlife (WDFW) and Point No Point Treaty Tribes (PNPTT). 2003. Report on summer chum salmon stock assessment and *[sic . . . just ended]*

[Original page 231]

Summary

For all but a few putative demographically independent populations of steelhead in Puget Sound, estimates of mean population growth rates obtained from observed spawner or redd counts are declining—typically 3 to 10% annually—and extinction risk within 100 years for most populations in the DPS is estimated to be moderate to high, especially for *draft* populations in the *putative* South Sound and Olympic MPGs. Collectively, these analyses indicate that steelhead in the Puget Sound DPS remain at risk of extinction throughout all or a significant portion of their range in the foreseeable future, but are not currently in danger of imminent extinction.

Status and Trends in the Limiting Factors and Threats Facing ESU/DPS

The Biological Review Team identified degradation and fragmentation of freshwater habitat, with consequent effects on connectivity, as a primary limiting factor and threat facing the Puget Sound steelhead DPS. In the three years since listing, the status of this threat has not changed appreciably.

Hatchery releases

Hatchery releases of steelhead in Puget Sound have remained relatively constant over the last 20 years, although releases of Chinook and coho have declined (Figure 104).

The Honorable Ricardo S. Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, Defendant.	NO. C70-9213 Subproceeding No. 01-1 (Culverts) DECLARATION OF PAUL J. WAGNER IN SUPPORT OF STATE OF WASHINGTON'S SUPPLEMENTAL BRIEFING

I, PAUL J. WAGNER, declare as follows:

1. I am a Branch Manager of the Washington State Department of Transportation (WSDOT) Environmental Services Office and manage the fish passage barrier correction program. This supplemental declaration is based on the best information available and provides an update on new and relevant facts which have arisen since my testimony in October 2009 for WSDOT's fish passage efforts.

2. For many years, WSDOT has recognized the need to provide fish passage at stream crossings. This recognition has continued to be manifested through the practical application of resources to salmon restoration, including barrier remediation. WSDOT has worked to correct fish passage barriers as part of highway improvement projects and through a separate dedicated-fund fish passage correction program.

3. WSDOT's efforts with fish passage have recently been recognized by the U.S. Federal Highway Administration (FHWA) as national examples of excellent environmental work. In October 2010, the FHWA presented WSDOT's fish passage program with the national Exemplary Ecosystem Award. In August 2011, I received FHWA's National Environmental Excellence Award for Leadership. This is presented to one person every two years and the award cited "coordination with WDFW resulting in the correction of over 250 culverts, improving over 800 miles of stream habitat to date" in the justification.

4 Since November 2010, WSDOT has also worked extensively with the National Marine Fisheries Service (NMFS), the Army Corps of Engineers, and FHWA to develop a programmatic process for ESA section 7 consultation on transportation projects. This includes an expedited approach for ESA compliance for fish passage restoration projects. NMFS issued a Biological Opinion signifying the completion of this consultation in November 2012.

FINANCIAL INVESTMENT

5. WSDOT continues to invest and make progress on fish barrier removal through its dedicated-fund program. Since October 2009, WSDOT has invested approximately $30 million dollars for the inventory, prioritization, and correction of high priority fish passage barriers. This $30 million investment funded 19 stand-alone fish passage projects with costs ranging from $191,270 to $6,750,667 per correction. Another 12 projects have

been constructed and funded as a part of other transportation projects.

6. WSDOT funds staff at Washington Department of Fish and Wildlife (WDFW) and coordinates with WDFW to inventory and prioritize fish barriers for correction. WSDOT has invested about $3.8 million for fish passage barrier inventory and prioritization since October 2009. In the 11-13 biennium, the funding for inventory and prioritization work is approximately $1.7 million dollars.

CULVERT INVENTORY

7. The fish passage barrier inventory has changed in scope several times since its inception. Streams are dynamic and proper conditions to assess fish passage are not always present. WSDOT continues its effort to keep the inventory information current and updated.

8. Beginning in the 09-11 biennium, WSDOT and WDFW started to reassess 357 culverts thought to have the highest likelihood of becoming barriers to evaluate their current status. Additionally, inventory crews revisit sites previously identified as barriers and reassess sites to ensure the information previously collected is accurate. This effort and dedication by WSDOT and WDFW results in the number of fish passage barriers being dynamic as barriers are being added and removed from the barrier list. Following the reassessments, WDFW records show as of July 2012, a statewide total for WSDOT of 1,988 fish passage barriers. Of those, 1,519 have significant habitat gain (at least 200 meters of potential fish habitat upstream). In the *United States v. Washington* Case Area, there are 1,000 barrier

culverts relevant to the case, of which 817 are barriers with significant habitat gain.

FISH BARRIERS REMOVED

9. When a fish passage barrier is identified and scheduled for correction, WSDOT works with WDFW to pick the best alternative for correcting the barrier. Culvert designs are based on the latest edition of WDFW's *Design of Road Culverts for Fish Passage Manual*. Where feasible, WSDOT prefers to use the most highly regarded design methodologies, which are stream simulation or a bridge, to correct culvert barriers. Through dedicated projects aimed at high priority fish barrier corrections, along with the corrections that are part of other highway improvement projects, WSDOT has corrected 31 barriers since October 2009. See Exhibit A. Twenty four of the 31 barrier corrections used either the stream simulation design or a bridge. The average cost of these 24 correction equaled $1,827,168 per correction. Twenty four of the 31 barrier corrections were located in the *United States v. Washington* Case Area. Collectively, the 31 barrier corrections improved fish access to more than 150 miles of potential habitat – which included 64 miles of potential habitat in the Case Area. Additionally, since October 2009, WDSDOT conducted extensive work on three culvert projects on SR 520 near Lake Washington. These corrections are expected to be completed in the summer of 2013.

10. WSDOT continues to make progress by investing in a prioritized approach because the habitat benefits of correcting individual culverts are not equal. As WSDOT moves down the prioritization

list, the amount of potential habitat that can be recovered through corrections will rapidly decline. Most of the habitat benefit can be obtained from the correction of a subset of barriers. As Exhibits B and C illustrate, the remaining 817 culvert barriers with significant habitat gain in the case area, over 50% of the potential habitat benefit is derived from correcting about 20% of the culverts.

I declare under the penalty of perjury that the foregoing is true and correct.

SIGNED at Olympia, Washington this 31st day of January, 2013.

s/Paul J. Wagner
PAUL J. WAGNER

EXHIBIT A – WSDOT Barrier Correction

WSDOT Region	Road	Site Id	Project Type	Mile Post	Stream	Tribto
1	SR 542	990606	Bridge	38.98	Chain-up Cr	NF Nooksack R
1	SR 542	991060	Stream Simulation	16.07	unnamed	Nooksack R
3	SR 305	990709	Stream Simulation	9.6	unnamed	Liberty Bay
3	US 101	991252	No Slope	335.02	unnamed	Hood Canal
3	SR 305	991742	Stream Simulation	9.88	Bjorgen Cr	Liberty Bay
4	US 101	992821	No Slope	3.3	unnamed	Columbia R
6	US 2	997498	No Slope	296.35	Deadman Cr	Little Spokane R
6	SR 27	998530	Stream Simulation	40.69	unnamed	Pine Cr
1	SR 548	990429	Stream Simulation	4.67	Terrell Cr	Birch Bay
1	SR 520	994119	Stream Simulation	5.81	unnamed	Yarrow Cr
1	SR 520	994459	Stream Simulation	4.48	unnamed	Lk Washington
1	SR 520	998987	No Slope	4.81	unnamed	Lk Washington
1	US 2	07.0939 0.40	Dam Removal	23.08	Wagleys Cr	Skykomish R
1	SR 20	AR11	Bridge	75.75	Red Cabin Cr	Skagit R
3	US 101	990032	Stream Simulation	102.14	unnamed	S Branch Big Cr
3	US 101	990729	Stream Simulation	100.9	unnamed	S Branch Big Cr
3	US 101	992493	Stream Simulation	68.99	unnamed	Lower Salmon Cr
3	I-5	999532	Stream Simulation	85.81	unnamed	Dry Cr
4	SR 105	990307	Bridge	16.57	Norris SL	Willapa R

Projects Completed Since June 2010.

WRIA	WSDOT Fund-ing	Cost*	Project Year	Lineal Gain (m)	Lineal Gain (mi)	PI	Spawn-ing Area (m^2)	Rear-ing Area (m2)
01	DI	1,286,196	2010	276	0.2	14.63	370	491
01	TP		2010	188	0.1			
15.0291	DI	2,887,452	2010	2,803	1.7	24.15	2,135	7,364
16.0218	OT		2010	210	0.1	12.24	617	268
15.0290	DI	3,546,564	2010	1,520	0.9	17.21	2,387	1,793
24	OT	49,698	2010	1,400	0.9	21.23	0	19,968
55.0051	TP		2010	92,225	57.3			
34	TP		2010	7,500	4.7			
01.0089	DI	1,553,230	2011	11,313	7.0	26.44	2,767	52,518
08	TP		2011	522	0.3	6.36	501	528
08.0257	TP		2011	2,391	1.5	14.8	888	985
08	TP		2011	1,051	0.7			
07.0939	DI	687,462	2011	15,105	9.4	50.82	4,785	45,461
03.0343	OT	3,610,665	2011	14,000	8.7			
22.0059	DI	1,071,041	2011	7,870	4.9	25.82	2,643	19,327
22.0059	DI	844,713	2011	1,202	0.7	17.97	13	2,895
24.0106	DI	1,505,251	2011	4,606	2.9	14.46	857	7,163
23	TP		2011	1,620	1.0			
24	OT	2,801,399	2011	2,500	1.6			

WSDOT Region	Road	SiteId	Project Type	Mile Post	Stream	Tribto
1	SR 9	931684	No Slope	2.65	unnamed	Great Dane Cr
1	SR 530	990151	Stream Simulation	42.99	Fortson Cr	NF Stillaguamish R
1	SR 167	991486	Stream Simulation	25.65	Panther Cr	Springbrook Cr
1	SR 520; WB on-ramp	994234	Stream Simulation	5.95	Yarrow Cr	Lk Washington
1	SR 520	991736	Stream Simulation	6.04	Yarrow Cr	Lk Washington
1	SR 520; WB on-ramp	994227	Stream Simulation	5.95	Yarrow Cr	Lk Washington
1	I-90	08.0183 1.60	Stream Simulation	18.83	EF Issaquah Cr	Issaquah Cr
3	SR 112	990304	Stream Simulation	47.1	Nelson Cr	Lyre R
3	SR 112	991730	Stream Simulation	25.6	unnamed	Pysht R
4	US 97	990052	Bridge	21.35	Butler Cr	E Prong Little Klickitat R
4	I-5	994301	Fishway	81.77	China Cr	Chehalis R
6	SR 21	990096	Stream Simulation	172.85	Curlew Cr	Kettle R

*Cost from the Transportation Executive Information
**Site 994234 is the most DS feature on Yarrow Creek. the potential habitat gain for these features are not

WRIA	WSDOT Funding	Cost*	Project Year	Lineal Gain (m)	Lineal Gain (mi)	PI	Spawning Area (m^2)	Rearing Area (m2)
08	TP		2012	200	0.1			
05.0254	DI	1,824,066	2012	1,030	0.6	12.92	860	1,391
09.0006	TP	6,750,667	2012	5,992	3.7			
08.0252	TP		2012	6,418	4.0	22.08	1,682	13,826
08.0252	TP		2012	**	**	23.18	*	*
08.0252	TP		2012	**	**	23.18	*	*
08.0183	DI	3,146,699	2012	12,900	8.0	46.85	25,294	39,818
19.0032	DI	1,985,457	2012	4,684	2.9	11.29	2,243	2,334
19	DI	983,588	2012	3,347	2.1	20.31	1,644	4,003
30.0140	DI	2,722,498	2012	22,067	13.7	7.46	20,754	19,275
23.0870	TP	191,270	2012	8,289	5.2	14.61	2,842	14,839
60.0288	TP	435,422	2012	23,909	14.9			

30,113,428

TOTALS: 257,138 159.8

73,282 254,247

System (TEIS) on 1/17/2013.
Sites 991736 and 994227 are upstream and therefore included in the total.

EXHIBIT B

Figure_. Graph showing the relationship between fixing barrier culverts relevant to the culvert court case and the present of potential habitat gain realized using a prioritization process. The amount of habitat upstream of each culvert barrier is quite variable. Most of the habitat is opened by fixing a subset the culverts (i.e. over 50% of the habitat comes from about 20% of the culverts). There is a diminishing habitat contribution benefit from fixing the lower priority culverts.

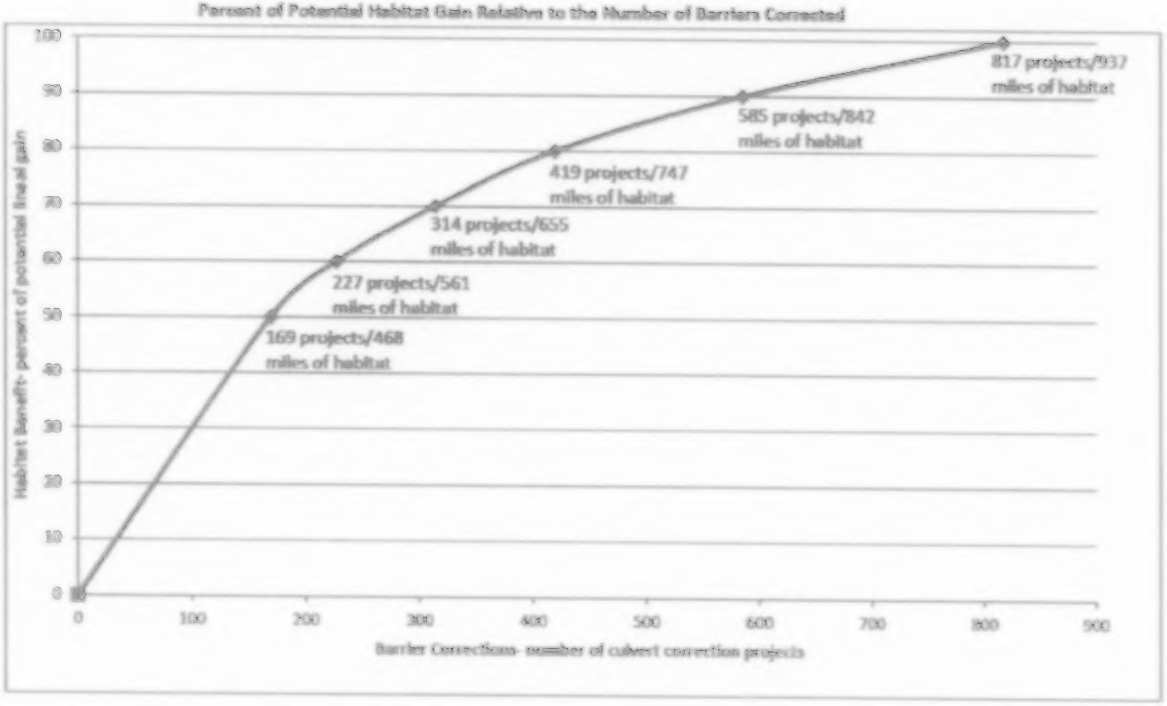
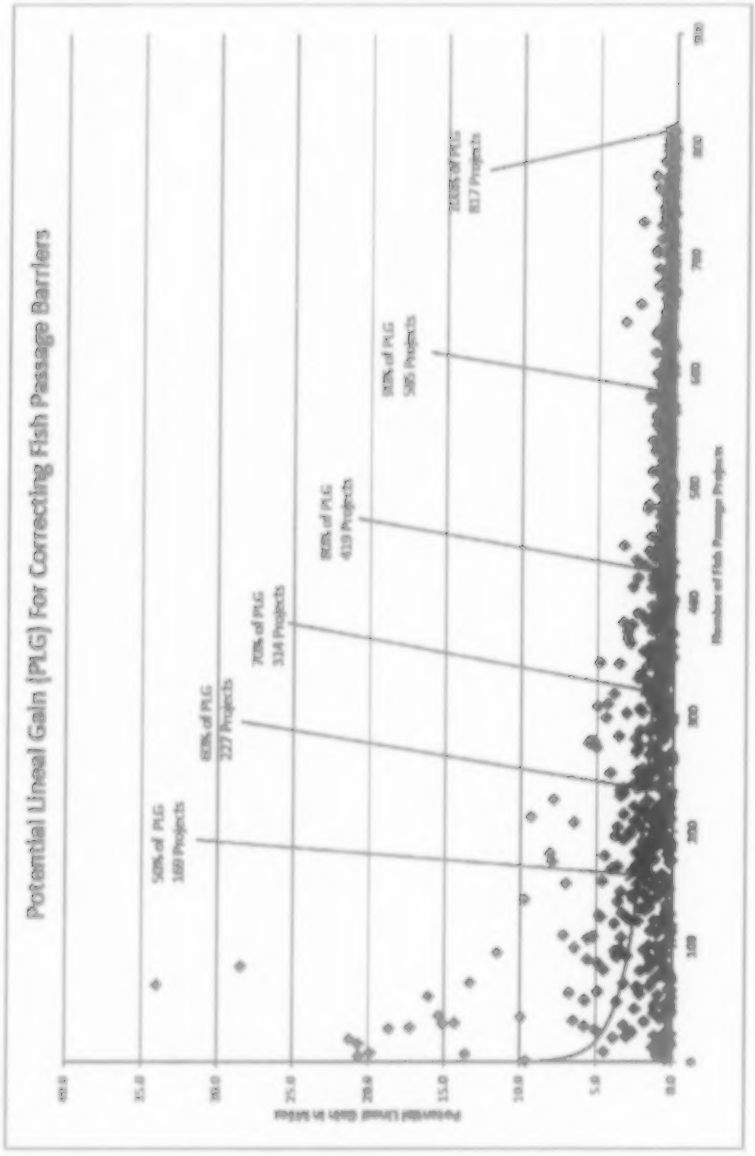

Percent of Potential Habitat Gain Relative to the Number of Barriers Corrected
Habitat Benefit- percent of potential final gain
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
700
800
900
Barrier Corrections- number of culvert correction projects
169 projects/468 miles of habitat
227 projects/561 miles of habitat
314 projects/655 miles of habitat
419 projects/747 miles of habitat
585 projects/842 miles of habitat
817 projects/937 miles of habitat

EXHIBIT C

Plot showing the potential lineal gain for each fish passage barrier using the barrier culverts in the file AnadromousCaseArea09-12.xlsx sorted by the PI and showing upstream WSDOT barriers being corrected in conjunction with downstream barrier in the same system. The number of barrier corrections and the potential lineal gain is based upon estimate for the remaining 817 barrier culverts with significant habitat gain relevant to the court case. All culverts are not the same. By prioritizing barrier correction, about 20% of the barrier corrections provide over 50% of the potential habitat benefit.


Potential Lineal Gain (PLG) For Correcting Fish Passage Barriers
50% of PLG
169 Projects
60% of PLG
227 Projects
70% of PLG
334 Projects
80% of PLG
419 Projects
85% of PLG
585 Projects
95% of PLG
817 Projects
Number of Fish Passage Projects

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiff, v. STATE OF WASHINGTON, et al., Defendant.	CASE NO. CV 9213RSM Subproceeding No. 01-1 DECLARATION OF ALIX FOSTER

I, ALIX FOSTER, declare as follows:

1. I am an attorney for the Swinomish Indian Tribal Community (SITC), a plaintiff herein.

2. This declaration describes my actions since the Court's January 11, 2013 Order Dkt. 733) to obtain information from the State and attaches and authenticates certain documents that the Tribes rely upon in their supplemental brief.

3. Pursuant to the Public Records Act (PRA), Ch.42.56 RCW, SITC sent separate requests to the Washington Departments of Transportation (WSDOT), Natural Resources (WDNR) and Fish and Wildlife (WDFW) and the Washington Parks and Recreation Commission (Parks) on January 16, 2013. Generally speaking, SITC sought records regarding the State's efforts to correct culverts in the case area since discovery closed in this action. On January 18 and 23, 2013, respectively, WDNR and WDFW produced their current culvert inventory databases. WSDOT, WDFW, and Parks have produced other

records in response to the requests, but no agency has fulfilled the request and each has told us it cannot do so by February 1, 2013.[1]

4. On January 24, 2013, I suggested to Mr. Shorin, WDFW Counsel, that the parties attempt to stipulate to certain updated admitted facts. On January 29, 2013, after receiving no response, I emailed my request to all opposing counsel. The next day, Mr. Tomisser, lead counsel for the State, emailed that it was "too close to [February 1] . . . to switch to an approach based on stipulations."

5. WSDOT and WDNR publish to their respective websites annual reports summarizing their culvert correction efforts. As of January 31, 2013, neither website had published a copy of a 2013 annual report summarizing the agency's efforts in 2012.

6. The exhibits to my declaration that are listed in the attached table are true and correct copies of excerpts of Washington State publications posted on Washington State websites or produced by

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[1] WSDOT failed to produce anything at all for 13 days and then produced approximately 1,700 pages of documents within 48 hours of the Court's February 1 deadline. WDFW failed to produce anything at all for 7 days, produced its database on January 23, released only 3 additional documents in the following week, and then produced over 1,800 pages of documents within 48 hours of the deadline. Parks failed to produce anything at all for 9 days, produced 12 documents on January 25, and has not produced anything since. WDNR initially produced its database on January 18 and did not produce anything again until today when it provided additional layers for its database.

Washington State agencies under the PRA in response to SITC's PRA requests.

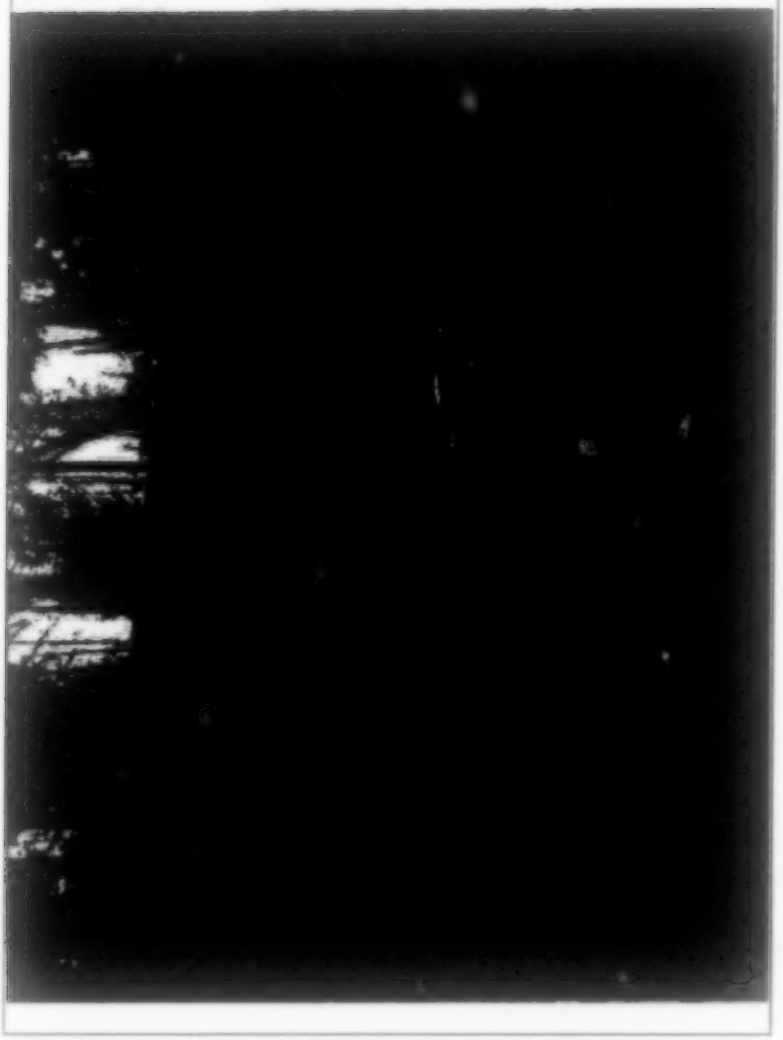
Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Executed this *1st* day of February, 2013, in La Conner, Washington.

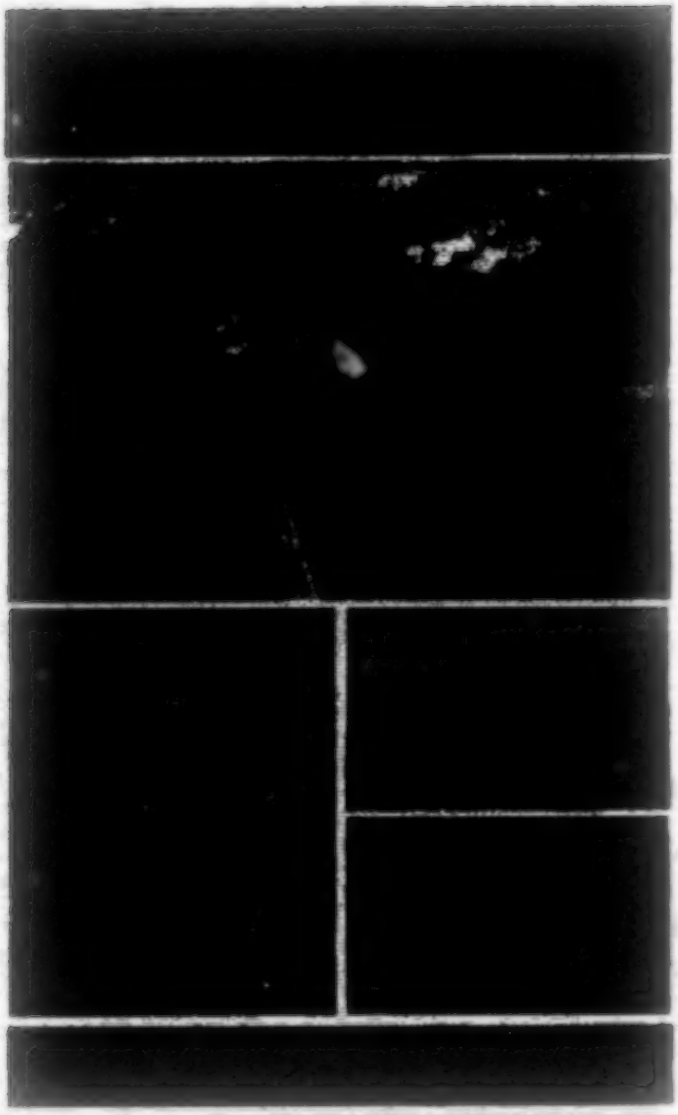
s/Alix Foster
Alix Foster

[Original page 26]

Original page 27]



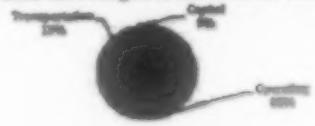
[Original page 31]



[Original page 32]

How Big Is The Overall State Budget?

As of the close of the 2012 Legislative Session, the State of Washington will spend a total of $74.5 billion for the 2011-13 biennium. That is an average of just over $101 million per day during the two-year spending period. This $74.5 billion includes amounts from three different budgets, which are plans of how the state will spend the money. The relative size of each of the three state budgets is shown in the following chart:



2011-13 State Budgets
(Dollars in Billions)

Operating Budget	$60.9
Transportation Budget	9.9
Capital Budget*	3.7
Total	$74.5

*Excludes Capital Re-appropriations (approximately $2.1 billion).
Sources: Wiznet and Buildnet budget development systems for the 2012 Session.

- The budget that pays for the day-to-day operations of state government (including federal funds and dedicated funds) is called the Operating Budget ($60.9 billion).
- The budget that pays for transportation activities, such as designing and maintaining roads and public transit, is called the Transportation Budget ($9.9 billion). This budget includes amounts appropriated for both transportation operating activities ($3.1 billion) and transportation capital activities ($6.8 billion).
- The budget to acquire and maintain state buildings, public schools, higher education facilities, public lands, parks, and other assets is called the Capital Budget ($3.7 billion).

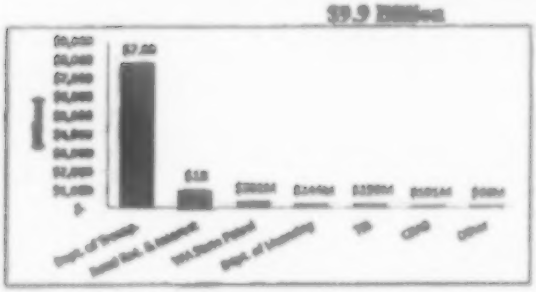
Budget-related materials frequently refer to the Near General Fund-State ("NGF-S"), which is the largest state fund; it represents more than half of the $60.9 billion operating budget.

[Original page 33]

HOW ARE TRANSPORTATION FUNDS SPENT BY AGENCY?

2011-13 Transportation Budget by Major Agency

$9.9 Billion



(See Page 19 for description of TIB and CRAB)

Washington Department of Transportation

The Washington Department of Transportation's (WSDOT) biennial budget is split approximately 82% for capital expenditures and 18% for operating expenditures. Operating programs and activities include maintenance of the state highway system, traffic services, ferry operations and security, highway traffic enforcement, traveler information, aviation services and transportation planning and research. Capital programs and activities include highway preservation and improvement projects, ferry boats and terminal preservation and rail line or car purchases and improvements.

[Original page 34]

Transportation Revenue Forecast Council

November 2012 Transportation Economic and Revenue Forecasts

Volume I: Summary

[Original page 35]

In FY 2010, transportation revenues were $2.014 billion which was a decline of 1% over the prior fiscal year as the economy struggled from the recession. In FY 2011, transportation revenues increased slightly to $2.05 billion or 2.3% growth over FY 2010. In FY 2012, transportation revenues are up again nominally to $2.09 billion or 1.7% annual increase. In FY 2013, transportation revenues are projected to be $2.210 billion, which represents an annual increase of 5.8% and a 0.1% revision from the September forecast. Overall during the 10-year horizon, transportation revenues are projected to be $33.10 billion with an average growth rate of 1.3% each year.

Figure 1 Total Transportation Revenues Comparison
November vs September 2012 forecasts
Millions of dollars

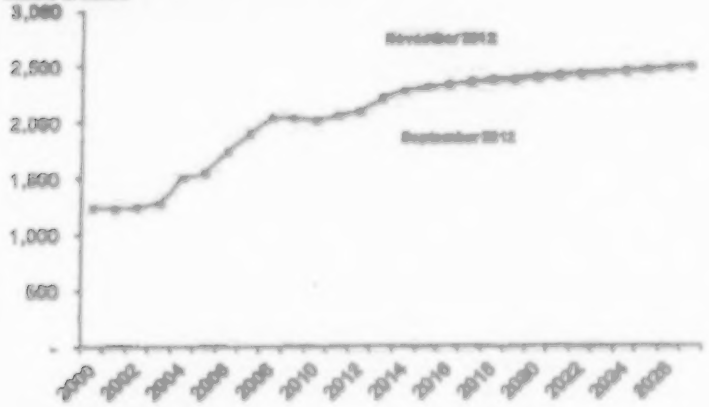
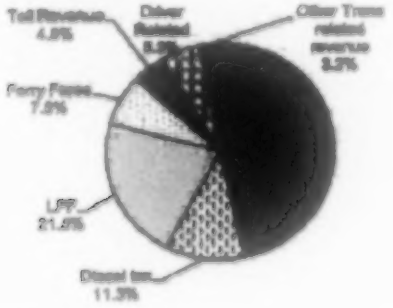
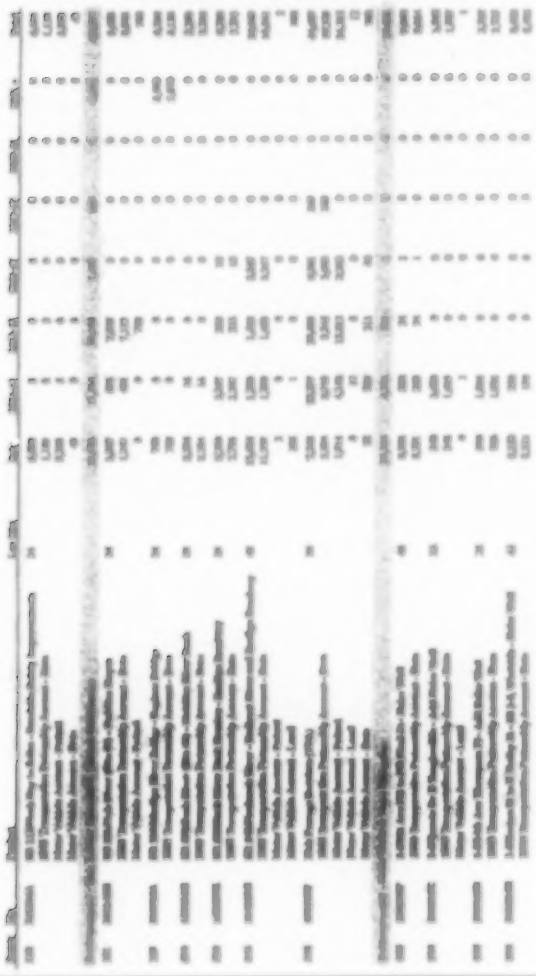


Figure 2 Revenue by Source
2011-13 biennium ($4.310 billion)



[Original page 36]

LEAP Transportation Document 2012-2C as developed
March 14, 2012
2003 Nickel Account and 2005 Transportation
Partnership Account Projects
Highway Improvements Program (I)
(Dollars in Thousands)



UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMEMRICA, et al. Plaintiff, v. STATE OF WASHINGTON, et al., Defendant.	CASE NO. CV 9213RSM Subproceeding No. 01-01 DECLARATION OF KEITH LUTZ

I, KEITH LUTZ, declare as follows:

1. I re-aver and incorporate ¶¶ 1-4 of my Aug. 11, 2006 Declaration ("Dec.") (Dkt. 299).

2. Using the methods described in Dec. ¶ 4, final Tribal harvest data 2008-2011 was:

	Chinook	chum	pink	Coho
2008	207,446	569,829	758	337,604
2009	184,881	355,560	1,946,714	508,356
2010	284,493	546,781	1,714	322,852
2011	285,147	621,129	2,280,645	379,952
TOTAL	961,967	2,093,299	4,229,831	1,548,764

	sockeye	steelhead	total
2008	46,043	37,564	1,199,244
2009	12,107	44,027	3,051,645
2010	1,242,303	48,369	2,446,512
2011	218,612	49,086	3,834,571
TOTAL	1,519,065	179,046	10,531,972

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

s/Keith Lutz
Keith Lutz
Date: *1-31-13*
At: *Lacey, WA*

The Honorable Ricardo S. Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, Defendant.	NO. C70-9213 Subproceeding No. 01-1 (Culverts) DECLARATION OF JEFFREY P. KOENINGS, PH.D., IN LIEU OF DIRECT TESTIMONY

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I, JEFFREY P. KOENINGS, Ph.D., declare as follows:

1. I currently hold a position with the Washington State Recreation and Conservation Office. The Recreation and Conservation Office manages grant programs and supports several boards whose work relates to fish conservation and outdoor recreation. I focus on international fisheries issues. I represent the States of Washington and Oregon on the Pacific Salmon Commission established under the Pacific Salmon Treaty between the United States and Canada. I have over 30 years of professional experience with salmon fisheries issues in western North America. My resumé is attached (Exhibit A).

2. I hold a Bachelor of Science in Fisheries, a Master of Science in Water Resources, and a Doctor of Philosophy in Natural Resources, all from the University of Michigan. I pursued post-doctoral studies as a National Science Foundation Post-Doctoral Fellow at the University of North Carolina at Chapel Hill.

3. After completing post-doctoral work, I spent over 20 years working for the Alaska Department of Fish and Game. I began my career as a research scientist studying the productivity of coho and sockeye salmon populations in freshwater

habitat, and the marine survival of coho and sockeye salmon. Because of my statewide responsibilities, I became an expert in the relationship between the flow of nutrients in aquatic ecosystems and fish production throughout Alaska. I have published peer-reviewed research in leading international journals, book chapters, and symposium proceedings.

4. As my career progressed, I moved into the management and policy arenas. I managed Alaska's hatcheries program, and then its commercial fisheries program. For eleven years, I worked on issues related to Alaska's role under the U.S./Canada Pacific Salmon Treaty. I represented the State of Alaska on technical bodies established under the Treaty, and I advised Alaska decision-makers on related policy matters. I also served as Alaska's non-voting representative on the Pacific Fishery Management Council, a body that manages ocean fisheries between three and 200 miles off the coasts of Washington, Oregon, and California under federal law. Because Chinook salmon from the Puget Sound, Washington Coast, and Columbia River watersheds migrate to and are caught to varying degrees in fisheries in Southeast Alaska, I became familiar with Pacific Northwest salmon fisheries issues.

5. In late 1998, I was selected as the Director of the Washington Department of Fish and Wildlife (WDFW). I held that position for ten years, from January 1999 to December 2008. As WDFW Director, I managed a biennial budget of $340 million and a staff of 1,700 talented, dedicated people. I oversaw fisheries management in Washington and nearby ocean waters, I worked with Oregon officials to adopt concurrent regulations for Columbia River

fisheries, and I ran one of the largest hatchery systems in the world. Throughout that time, I worked extensively with tribal fishery co-managers on salmon harvest regimes, production of hatchery-origin salmon, and recovery planning and habitat actions to restore salmon. I was, and still am, deeply involved in salmon issues in the Pacific Northwest.

I. Salmon Abundance in the *United States v. Washington* Case Area And Factors That Affect It

6. The *United States v. Washington* Case Area is home to six species of Pacific salmon, including steelhead. Section 1.1 of Joint Exhibit 2a prepared for the 1973 trial in *United States v. Washington*[1] describes their general life histories. Salmon are "anadromous." These iconic Northwest species move throughout our entire aquatic ecosystem—beginning life in inland freshwater spawning streams, migrating down major river systems, sheltering along estuaries and coastlines, finally heading out to marine waters and then repeating their journey homeward—to complete their life cycle. Adverse or beneficial conditions anywhere along the path have dramatic effects on adult salmon abundance. Because of these effects, salmon hatcheries were established decades ago throughout the Pacific Northwest to stabilize the abundance of adult salmon, primarily to support fisheries, without much thought to the effects on wild

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[1] Joint Statement Regarding the Biology, Status, Management, and Harvest of the Salmon and Steelhead Resources of the Puget Sound and Olympic Peninsular Drainage Areas of Western Washington (May 14, 1973). (Excerpts attached as Exhibit B.)

salmon populations. The presence of hatchery-origin and wild salmon mixed together in many fisheries complicates harvest management, as managers strive to catch the hatchery fish while minimizing the incidental catch of wild fish that are now listed as threatened or endangered under the federal Endangered Species Act (ESA).

7. Pacific salmon populations from California to southern British Columbia have declined substantially over the past century. Many factors have contributed to the decline. Some, such as cyclic ocean conditions, are natural phenomena. Others, such as water pollution, are human-caused. The factors contributing to salmon population declines are summarized in an attached excerpt from the *Washington Statewide Strategy to Recover Salmon: Extinction is Not An Option—Summary* (September 1999) (Exhibit C), and at pages 5-45, 5-46, and 5-60 of the December 2008 Biological Opinion that the National Marine Fisheries Service (NOAA Fisheries) prepared in connection with the Pacific Salmon Treaty (attached as Exhibit D). The relative importance and effect of these factors, known as the "four H's" (harvest, hatcheries, hydroelectric power, and habitat), varies from species to species and watershed to watershed. Within the habitat "H," culverts that block fish passage can be a factor, but they are just one among many. For example, in its listing determinations under the federal Endangered Species Act, NOAA Fisheries has identified seven major habitat-related factors limiting salmon recovery statewide. Major limiting factors are the main attributes that must be addressed in recovery. Among the seven factors, we have made the most

progress, on average, in addressing fish passage issues. See Page 29, *2008 State of Salmon in Watersheds* (Exhibit E, Bates No. F0013133.)

8. In the early 1990s, the salmon's plight drew renewed public attention as federal Endangered Species Act listings began to occur in the Columbia River Basin. Just what was the condition of wild salmon in Washington? To answer that question, the Western Washington Treaty Tribes and the Washington Departments of Fisheries and Wildlife completed a Salmon and Steelhead Stock Inventory (SASSI) in 1992. State and tribal biologists sought to determine how many individual salmon and steelhead stocks there are in Washington, and the status of each. They defined a "stock" as "The fish spawning in a particular lake or stream(s) at a particular season, which fish to a substantial degree do not interbreed with any group spawning in a different place, or in the same place at a different season." Chinook salmon from Issaquah Creek are a SASSI "stock," for example. The 1992 SASSI became part of the basic information that policy makers used for salmon recovery efforts during the next decade.

9. During the 1990s, NOAA Fisheries conducted a systematic review of all salmon populations in California, Oregon, and Washington to determine whether they should be considered for listing as threatened or endangered under the federal Endangered Species Act. NOAA Fisheries developed a policy for identifying an "evolutionarily significant unit" of salmon (ESU) that would fit the ESA statutory definition of a "species." Steelhead salmon were grouped into "distinct population segments" for the same purpose. An ESU or "distinct population

segment" (DPS) may be broader than a "stock" as defined by SASSI, and may include several stocks.

10. Between 1994 and 1999, NOAA Fisheries identified dozens of Pacific salmon ESUs, reviewed the status of each and the factors affecting survival and abundance, and published the findings in the Federal Register. NOAA Fisheries conducted further reviews between 2003 and 2005. In 2008, the U.S. Fish and Wildlife Service initiated a review of the status of Lake Sammamish kokanee, a land-locked form of sockeye salmon. Here is a summary of the current Endangered Species Act status of anadromous salmon ESUs and steelhead DPSs in the *United States v. Washington* Case Area:

ESU or DPS	ESA Status	Federal Register Cite
Chinook Salmon		
Puget Sound Chinook	Threatened	63 Fed. Reg. 11482 (March 9, 1998) (proposed listing) 64 Fed. Reg. 14308 (March 24, 1999) (final listing) 70 Fed. Reg. 37160 (June 28, 2005) (reaffirmed listing)
Washington Coast Chinook	Not listed	63 Fed. Reg. 11482 (March 9, 1998)
Coho Salmon		
Puget Sound/ Strait of Georgia Coho	Species of Concern	69 Fed. Reg. 19975 (April 15, 2004)

Olympic Peninsula Coho	Not listed	60 Fed. Reg. 38011 (July 25, 1995)
Chum Salmon		
Puget Sound/ Strait of Georgia Chum	Not listed	63 Fed. Reg. 11774 (March 10, 1998)
Hood Canal Summer Run Chum	Threatened	63 Fed. Reg. 11774 (March 10, 1998) (proposed listing) 64 Fed. Reg. 14508 (March 25, 1999) (final listing) 70 Fed. Reg. 37160 (June 28, 2005) (reaffirmed listing)
Pacific Coast Chum	Not listed	63 Fed. Reg. 11774 (March 10, 1998)
Pink Salmon		
Odd-Year Pink	Not listed	60 Fed. Reg. 51928 (Oct. 4, 1995)
Even-Year (Snohomish) Pink	Not listed	60 Fed. Reg. 51928 (Oct. 4, 1995)
Sockeye Salmon		
Baker River Sockeye	Not listed	63 Fed. Reg. 11750 (March 10, 1998)
Ozette Lake Sockeye	Threatened	63 Fed. Reg. 11750 (March 10, 1998) (proposed listing) 64 Fed. Reg. 14528 (March 25, 1999) (final listing)

		70 Fed. Reg. 37160 (June 28, 2005) (reaffirmed listing)
Lake Pleasant Sockeye	Not listed	63 Fed. Reg. 11750 (March 10, 1998)
Lake Quinault Sockeye	Not listed	63 Fed. Reg. 11750 (March 10, 1998)
Steelhead		
Puget Sound Steelhead	Threatened	71 Fed. Reg. 15666 (March 29, 2006) (proposed listing) 72 Fed. Reg. 26722 (May 11, 2007) (final listing)
Olympic Peninsula Steelhead	Not listed	61 Fed. Reg. 41541 (Aug. 9, 1996)
Southwest Washington Steelhead	Not listed	61 Fed. Reg. 41541 (Aug. 9, 1996)

11. In 2002, the Washington Department of Fish and Wildlife updated the 1992 Salmon and Steelhead Stock Inventory, now called the Salmonid Stock Inventory (SaSI). Tables showing the 2002 status of stocks that spawn within the *United States v. Washington* Case Area are attached as Exhibit F. (Stocks from Willapa Bay, which is outside the Case Area, are also shown on the tables.) Here is a summary:

Condition of Salmon and Steelhead Stocks in U.S. v. Washington Case Area, as Reported in 2002 WDFW Salmonid Stock Inventory (SaSI)					
Region	**Healthy Stocks**	**Depressed Stocks**	**Critical Stocks**	**Stocks Whose Status is Unknown**	**Extinct Stocks**
North Puget Sound	25	15	2	24	0
South Puget Sound	28	14	3	12	1
Hood Canal	17	14	2	8	6
Strait of Juan de Fuca	11	9	5	16	1
North Coast	31	3	1	34	0
Grays Harbor	16	8	0	4	0
TOTALS	128	63	13	98	8

12. The ESA reviews and the 2002 SaSI tables only hint at the wide variation in the condition of *U.S. v. Washington* Case Area salmon and steelhead stocks. For example, wild chum salmon that spawn in Kennedy Creek, which flows into Totten Inlet in Mason County, are so numerous that the Kennedy Creek fall chum run has become a tourist attraction. But wild summer chum from Hood Canal are listed as threatened under the ESA.

13. Because they are only a snapshot, the SaSI tables do not show the year-to-year variability in run sizes. A scouring winter flood in a particular watershed can depress a stock for years, for example. That may have happened to Quillayute Chinook salmon in December 2007. Conditions that

affect the amount of food available to salmon while they are maturing in the ocean can have a large impact on the abundance of many stocks. Short-term El Niño events, and the long-term Pacific Decadal Oscillation, are cyclic natural phenomena that affect ocean water temperatures and currents—and food availability for salmon. When food is scarce, salmon die, and state and tribal fishery co-managers must constrain fisheries on the returning adults. We saw several years of poor ocean conditions for Pacific Northwest salmon, and meager fisheries, during the mid-1990s. Those effects are illustrated in tribal harvest numbers shown in the tables and graphs attached to the Declaration of Keith Lutz in Support of Tribes' Motion for Summary Judgment (Doc. No. 18654/299) (attached as Exhibit G). Climate change, and its potential effects on the salmon life cycle, pose additional challenges and unknowns. Some of these are briefly described in the attached testimony that I provided to a United States Senate committee in 2008 (Exhibit H).

14. The SaSI tables do not include salmon stocks that spawn in Canada, but some Canadian salmon stocks are important contributors to treaty Indian and non-treaty fisheries within the *United States v. Washington* Case Area. Historically, the Fraser River in British Columbia supported huge runs of sockeye and pink salmon, as well as chum, coho, and Chinook. Fraser River salmon migrate in variable numbers through Washington waters in the Strait of Juan de Fuca and northern Puget Sound on their way to the Fraser River mouth at Vancouver. They pass through the usual and accustomed fishing grounds of nine of the *United States v. Washington* Tribes. The

Pacific Salmon Treaty governs allocation of the catch between Canadian and American fishermen, and orders in *United States v. Washington* govern treaty Indian/non-Indian allocation in the United States. A special panel established under the Pacific Salmon Treaty manages fisheries on Fraser River fish. *United States v. Washington* Tribes and WDFW have representatives on that panel.

15. Salmon from the Fraser River and some other British Columbia rivers have been struggling in recent years, just like their neighbors to the south. There have been three failures of the Fraser River sockeye run since 1998. The Fraser River sockeye fisheries failed in 1999, 2007, and 2008. As shown in the figures provided by the Tribes in the Declaration of Keith Lutz (Exhibit G, attached), the strength of the Fraser run can make a big difference in the overall tribal catch. In 1985, 20 percent of the Tribes' total catch was Canadian-origin sockeye, but in 1999, a year in which the Fraser River sockeye fisheries failed, only four percent of the Tribes' total catch was Canadian-origin sockeye.

16. Because many factors affect salmon abundance, catch levels in fisheries can fluctuate over time. Though 2008 was a poor year for Fraser River sockeye, we saw record returns of sockeye to the Columbia and Snake River Basins, the highest since 1950. Similarly, catch levels in Chinook fisheries in the North Pacific region have varied dramatically from each other in recent years. Chinook salmon from many rivers, including Washington rivers, mature in the marine waters off Southeast Alaska and British Columbia. Fisheries in those waters are set according

to the overall number of Chinook available. Between 2005 and 2008, the pre-season Chinook abundance-based catch levels decreased by about 50% off Southeast Alaska and Northern British Columbia, but remained fairly stable off the West Coast of Vancouver Island.

II. Efforts to Make Things Better for Salmon: Integrating or Connecting "The Four Hs"

A. Introduction

17. The late 1990s were times of turmoil in salmon fisheries management in the Pacific Northwest. For several years, the United States and Canada had been unable to agree on an update to the Pacific Salmon Treaty, which limits catches in fisheries on salmon stocks that migrate between the two countries. Heavy fishing in both countries was putting salmon stocks at risk. In the Columbia River, several salmon and steelhead stocks had been listed as threatened and endangered under the federal Endangered Species Act. In *United States v. Oregon*, the Columbia River counterpart to *United States v. Washington*, the States, Tribes, and the Federal Government had been taking each other to court over disagreements about how to manage fisheries in the face of ESA constraints. In Puget Sound, additional ESA listings were on the horizon. That was the situation I found when I arrived at WDFW in early 1999.

18. I believed then, and still believe today, that the best way to rebuild sustainable salmon populations is through an integrated, holistic system of stewardship that provides protection and support throughout the salmon's entire life cycle. Fisheries

managers call this "gravel-to-gravel" management, because it extends from the gravel streambeds where salmon first emerge from their eggs as fry, out to the open ocean where the salmon feed and mature to adults, and back to the gravel of the natal streams, where the adult salmon return to spawn and create the next generation. A "gravel-to-gravel" management approach is possible only through collaboration between all the people whose lives are intertwined with the salmon.

19. To enhance that collaboration, one of my top priorities when I came to WDFW was to reestablish a co-manager relationship between WDFW and tribal governments. One of the first things I did when I arrived was to establish a new unit within the Department that is now called the Intergovernmental Resource Management (IRM) group. Its primary mission is to work cooperatively with the Indian Tribes that have federally-secured fishing and hunting rights in Washington, in government-to-government, co-management relationships. I also made organizational changes within WDFW to carry out my philosophy that science should drive decision-making, not the other way around.

20. As of 1999, it was already Washington State policy to take the lead in responding to ESA salmon listings. Human activity that affects salmon survival and recovery has been categorized into "4 H's"—harvest, hatcheries, hydroelectric power, and habitat. As described in the attached testimony that I provided to a Washington State legislative committee in 2004 (Exhibit I), the Washington Legislature adopted several key pieces of legislation over several legislative sessions, beginning in 1998, to address all

four "H's", both in the short term and over the long term. Most of the legislation is currently codified in Chapters 77.85 and 77.95 of the Revised Code of Washington. During my ten years as WDFW Director, my staff and I worked with the fishery co-manager Tribes, including those in *United States v. Washington* and *United States v. Oregon*, state, federal, and Canadian officials, the Washington Legislature, the United States Congress, local governments, and non-governmental groups to implement the legislative policies and improve conditions for wild salmon in all four "H's" throughout Washington State. This work is summarized in guest columns I wrote for the Seattle Post-Intelligencer in 2003 and 2008, both of which are attached (Exhibits J and K).

B. Harvest

21. Fisheries management within the *United States v. Washington* Case Area has changed quite a bit since Judge Boldt issued his injunction in March 1974. Some of those changes occurred before I arrived at WDFW, and some occurred under my direction. WDFW and the Tribes have modified fisheries management to focus more on the needs of individual stocks. We reduced fishing pressure on many wild stocks, allowing a greater percentage to return to the spawning grounds. NOAA Fisheries described some of those changes in a December 2008 Biological Opinion, noting that, while overfishing contributed to declines of Puget Sound Chinook and Hood Canal Summer Chum in the 1980s and early 1990s, state and tribal fishery co-managers have made reforms designed to allow those salmon

populations to rebuild. (See Exhibit D, pages 5-46, 5-60, 5-61, 9-18, 9-19, 9-28; Bates Nos. F0009884, F0009898-99, F0010102-03, F0010112.)

22. To help wild Chinook reach the spawning grounds, WDFW and the Puget Sound Treaty Indian Tribes jointly developed a Resource Management Plan (RMP) for Puget Sound Chinook under the federal Endangered Species Act. The RMP provides the framework under which WDFW and the Tribes manage salmon fisheries that affect Chinook in the greater Puget Sound area. WDFW and the Tribes completed the RMP in 2004 and submitted it to NOAA Fisheries for approval. NOAA Fisheries determined that the RMP is consistent with the federal ESA, concluding that state and tribal harvest would not jeopardize the existence of ESA-listed fish or impede their recovery. Third parties filed a lawsuit challenging that determination, but Judge Lasnik rejected the challenge in *Salmon Spawning & Recovery Alliance v. Lohn*, No C06-1462RSL (W.D. Wash. March 20, 2008). The current RMP will expire in 2010, and WDFW and the Puget Sound Treaty Indian Tribes are already working on a new one.

23. Harvest reform by WDFW and the Treaty Indian Tribes is not enough, however. As shown in Figure 7 of *United States v. Washington* Joint Exhibit 2a, juvenile Chinook salmon from Washington rivers migrate to Canadian and Southeast Alaskan marine waters before reversing their migration and returning to Washington as adults to spawn. People fish for them in those waters. In recent years, between one-third and two-thirds of all Chinook salmon that were harvested in the three major mixed-stock fisheries off the coasts of Southeast

Alaska and British Columbia originated in Washington waters, as depicted in Exhibit L. It is estimated that about one-third of those fish were wild salmon, many listed as threatened or endangered under the federal Endangered Species Act. New data showed that a Chinook agreement negotiated by the United States and Canada in 1999 was not performing as expected. Canadian catches of some U.S.-origin Chinook, primarily from the Lower Columbia River and Puget Sound, exceeded those anticipated by the 1999 negotiators. A lawsuit related to that situation came before this Court, *Salmon Spawning & Recovery Alliance v. Gutierrez*, No. C05-1877RSM (W.D. Wash.).

24. The 1999 U.S./Canada agreement was due to expire at the end of 2008, and at the beginning of 2007 the two countries began negotiating a replacement agreement through the United States/Canada Pacific Salmon Commission. I was appointed to be the Washington and Oregon Commissioner, and I served as the Pacific Salmon Commission Chair in 2007-08. Other people involved in the negotiations with Canada included Ron Allen of the Jamestown S'Klallam Tribe, and representatives from Alaska, Oregon, the Columbia River Treaty Tribes, and federal agencies. In addition, Terry Williams of the Tulalip Tribes and Lorraine Loomis of the Swinomish Tribe were observers at most of the negotiating sessions.

25. In May 2008, after nearly 18 months of negotiations, the Pacific Salmon Commission reached an agreement. The Chinook portion of the agreement is attached, along with a letter of transmittal to the United States and Canadian governments (Exhibit

M). The terms of the agreement require the West Coast Vancouver Island fishery in British Columbia and the Southeast Alaska fishery to reduce their catch of Chinook salmon by 30 percent and 15 percent, respectively, in each year during the 2009-2018 period. The agreement is grounded in science and is designed to be responsive to changes in salmon stock status over time. NOAA Fisheries determined on December 22, 2008 that, if implemented, the agreed-to fishing regimes, in combination with existing Chinook management regimes in Washington, are not likely to jeopardize the continued existence or impede recovery of any threatened or endangered species (Exhibit D). Canada and the United States exchanged diplomatic notes on the following day, and the new agreement entered into force on January 9, 2009. The new agreement and related documents are posted on the Pacific Salmon Commission web site, http://www.psc.org/Index.htm. The agreement is expected to increase the number of wild and hatchery-origin Chinook salmon returning to Washington, giving state and tribal fishery managers in the *United States v. Washington* Case Area more latitude when planning fisheries on hatchery Chinook while protecting wild Chinook. We should begin to see those effects in 2009 fisheries, before the trial in this Subproceeding commences. Most importantly, the new agreement will help fishery managers to meet the recovery exploitation rates for most wild Puget Sound Chinook stocks.

26. NOAA Fisheries has also predicted that, for most Puget Sound Chinook stocks, the new agreement with Canada is likely, in varying degrees, to boost the number of wild Chinook that reach the

spawning grounds. (See Exhibit D, pages 7-67, 7-78, 7-88; Bates Nos. F0010017, F0010028, F0010038.) That will allow the fish to explore unused habitat, expand existing spawning areas, and pioneer new spawning grounds.

27. It will take money to implement the new Pacific Salmon Treaty agreement. The agreement specifies that the United States shall make available up to $37.5 million to invest in scientific support and to ease the pain of fishery reductions in Canada. The United States negotiators, including the Tribes, are also asking Congress for an additional $30 million over ten years to pay for hatchery and habitat projects designed to improve the status of Dungeness, Nooksack, Skagit, Stillaguamish, and Snohomish Chinook stocks from the *United States v. Washington* Case Area. An additional $30 million is being requested to ease the economic impact of reducing fisheries in Southeast Alaska. In September 2008, January 2009, and March 2009 I traveled to Washington, D.C., to seek such funding, along with tribal representatives from Puget Sound and the Columbia River and representatives from the States of Alaska and Oregon.

28. The tables and other information in NOAA Fisheries' December 2008 Biological Opinion on the new Pacific Salmon Treaty agreement suggest that our harvest reforms and other measures are bearing fruit. Information provided by the Tribes and WDFW shows that salmon abundance and escapement of Puget Sound Chinook and Hood Canal Summer Chum stocks is generally trending upward, although NOAA Fisheries cautions that increased escapements of wild adults may be affected by the

presence of hatchery origin Chinook. (Exhibit D, Table 5.1.4.1-4 and Figure 5.2.1.1-2, pages 5-51 and 5-62, Bates Nos. F0009889 and F009900.)

29. A new report from the Washington Governor's Salmon Recovery Office is also encouraging. The *2008 State of Salmon in Watersheds* report considered the abundance of wild Chinook in the Puget Sound Salmon Recovery Region by comparing pre-ESA listing years with post-ESA listing years. Overall, the abundance and escapements of wild Chinook across the region and within the major population groups showed increases, though some groups are not doing as well as others. (See Exhibit E, pages 35 and 37; Bates Nos. F0013139 and F001341.) As NOAA Fisheries has put it, however, "Survival and recovery of the Puget Sound Chinook Salmon ESU will depend, over the long term, on improvements in habitat conditions, and reductions in the effects of hatcheries, in addition to the harvest reforms that have been and are being implemented." (Exhibit D, page 5-52; Bates No. F0009890.)

C. Hatcheries

30. Hatcheries produce the vast majority of the salmon harvested in the Pacific Northwest, generating significant economic, recreational and cultural benefits for the State of Washington, including the Treaty Tribes. For example, 60 to 70 percent of the Chinook caught in Puget Sound-area fisheries currently are of hatchery origin. But hatchery fish can also pose risks to wild fish, ranging from genetic mixing to competition for food. That has sparked an ongoing series of reforms, designed to

prevent hatchery fish—and the facilities that produce them—from interfering with wild salmon, while providing increased catches in tribal and non-tribal fisheries.

31. In Fiscal Year 2000, Congress appropriated funds to establish the Puget Sound and Coastal Washington Hatchery Reform Project. Its goals are to use science to reform hatcheries so that they will conserve wild salmon and steelhead populations while supporting sustainable tribal and non-tribal fisheries. An independent group of scientists, the Hatchery Scientific Review Group (HSRG), was established to provide guidance to policymakers and hatchery managers based on the best available science. Some of the scientists are current or retired employees of WDFW, some are affiliated with *United States v. Washington* Indian Tribes, and some work for federal agencies.

32. Between 2001 and 2003, the HSRG reviewed more than 200 state, tribal, and federal hatchery programs at over 100 hatcheries in the Puget Sound and Washington Coastal regions. In 2004, the HSRG published a report containing over 1,000 recommendations for change at individual hatcheries, along with 18 recommendations to be applied across the entire system. State, tribal, and federal hatchery managers have taken steps to implement the recommendations, and have developed databases to track the status of each one. Since 2004, WDFW and the Tribes have addressed more than 800 of the HSRG's recommendations.

33. In response to the HSRG recommendations, WDFW and the *United States v. Washington*

Tribes have discontinued several hatchery programs and have retooled others so that they will support, not degrade, naturally-spawning salmon and steelhead populations. An example is a plan that WDFW and the Tulalip Tribes jointly developed to restructure hatchery runs returning to the Tulalip Tribes' hatchery on Tulalip Bay. WDFW and the Tribes have also made infrastructure changes in their hatchery programs. For example, WDFW and the Stillaguamish Tribe have collaborated in making improvements at facilities on the Stillaguamish River.

34. All of this takes money, and many of the hundreds of HSRG recommendations that remain to be implemented are the ones that are the most costly and time-consuming. Cost estimates for capital (large construction) funds range between $100 and $150 million to accomplish the HSRG-recommended reforms at state hatcheries in the Puget Sound region alone. Another $5 to $10 million in state operating funds are also required. As of December 2008, planned renovations at WDFW's Voights Creek Hatchery in the Puyallup watershed were expected to cost about $16 million to meet HSRG recommendations and bring the hatchery up to current water quality standards. Because recent winter flooding has caused additional damage, creating additional costs, WDFW has proposed to close the Voights Creek facility altogether, with resulting loss to fisheries. Funding for reforms at all state, tribal, and federal hatcheries has been slow to materialize, and is lagging behind funding for other salmon recovery efforts.

D. Hydroelectric Power

35. With respect to their effect on Washington salmon, hydroelectric power dams get the most public attention in the Columbia River Basin, but they have a role for salmon in the *United States v. Washington* Case Area, as well.

36. The Baker River, a tributary to the Skagit River, has two hydroelectric dams that are currently operated by Puget Sound Energy under a license from the Federal Energy Regulatory Commission. As the expiration date of the original 1956 license neared, Puget Sound Energy negotiated with WDFW, the Upper Skagit, Swinomish, and Sauk-Suiattle Tribes, the Northwest Indian Fisheries Commission, and others over the terms of a new one. The parties reached agreement, and in October 2008 the Federal Energy Regulatory Commission approved the new license with the terms they had negotiated. The new license includes provisions for improved salmon propagation facilities, better management of water flows for fish, means for getting fish past the dams, in-river fish habitat enhancement with gravel and woody debris, and strategies for controlling shoreline erosion. These measures are expected to increase salmon production, primarily sockeye, from the Baker River.

37. When I arrived at WDFW, a small dam on Goldsborough Creek, in Mason County, blocked fish passage to 14 miles of excellent habitat. Goldsborough Dam had been built in 1921 to supply power to the City of Shelton, but it was no longer being used for any purpose. It was identified as a good candidate for removal because of the anticipated fish

benefits relative to the cost of removal. In 2001, after years of planning, Goldsborough Dam was removed in a $4.8 million project that involved WDFW, the Squaxin Island Tribe, the United States Army Corps of Engineers, Simpson Timber Company, and others. In 2007, the Squaxin Island Tribe reported that 41,200 out of 42,172 juvenile coho migrating out of the creek came from the area upstream of the old dam site.

38. Negotiations and studies about making some small dams in Western Washington more fish-friendly are underway in connection with proceedings before the Federal Energy Regulatory Commission. Examples include the Jackson Project on the Sultan River in the Snohomish River Basin and the Morse Creek Project near Port Angeles. Tribes are involved in both matters. Two large fish-blocking dams in the *United States v. Washington* case area are slated for removal, the Elwha and Glines Canyon Dams on the Elwha River in Olympic National Park. Removal is expected to cost hundreds of millions of dollars.

E. Habitat

39. As part of the package of salmon recovery legislation that it enacted in the late 1990s, the Washington Legislature established a process under which regional salmon recovery organizations could form and develop regional salmon recovery plans. Seven regional salmon recovery organizations have been formed, three of them within the *United States v. Washington* Case Area. Six regional recovery plans have been submitted to and approved by NOAA Fisheries. Two of them were developed for parts of the *United States v. Washington* Case Area: The Puget

Sound Salmon Recovery Plan, and the Hood Canal Chum Recovery Plan. The Governor's Salmon Recovery Office has prepared a summary of these plans (attached as Exhibit N), and their status as of the end of 2008 (attached as Exhibit E). The *United States v. Washington* Tribes and WDFW were involved in the development of both plans, co-authoring the Skagit Chinook section of the Puget Sound plan. NOAA Fisheries adopted both plans, with additions, in 2007. The Tribes and WDFW are also involved in the development of a recovery plan for Lake Ozette sockeye, and in the discussions about the development of a recovery plan for Puget Sound steelhead.

40. Most locally-developed recovery plans include provisions for all four "Hs," but habitat may be their greatest strength because that is where local communities and property owners can do the most. The Puget Sound Salmon Recovery Plan, which is expected to take 50 years to implement, takes an ecosystem approach within 14 local watersheds. Actions to be implemented include estuarine restoration, nearshore habitat restoration, floodplain restoration, streamside riparian habitat restoration, measures to create better water flow conditions for fish and clean up pollution—and fish passage barrier correction.

41. In 1999, the Washington Legislature established the Washington State Salmon Recovery Funding Board (SRF Board), one of the boards supported by the Recreation and Conservation Office where I currently work. While I was WDFW Director, a member of my staff served as a non-voting member on the SRF Board under my direction. The voting

members of the SRF Board include a representative from one of the *United States v. Washington* Tribes. The Salmon Recovery Funding Board makes grants for salmon habitat projects and other salmon recovery activities. The SRF Board has set up procedures and criteria for making annual funding awards in order to allocate funds fairly across the state in a manner that will provide the most benefit to salmon. Applicants compete for the awards. Since 2000, the SRF Board has funded 430 projects in the Puget Sound Region, totaling more than $131 million. Grant recipients have provided nearly $84 million in matching funds, for a total investment of more than $215 million. During the same period, the SRF Board has funded 80 projects in the Hood Canal Region totaling more than $24 million. Grant recipients have provided nearly $19 million, for a total investment of $42.3 million. In both regions, habitat restoration, including culvert replacements, represents about 50% of the expenditures. Some of the money comes from state funding sources, and some of it comes from the Pacific Coastal Salmon Recovery Fund (PCSRF) established by Congress. Some $233 million of federal PCSRF monies have been distributed in Washington State in accordance with a Memorandum of Understanding between the SRF Board and NOAA Fisheries, which requires a minimum of 25% in non-federal matching funds.

42. Indian Tribes are eligible for and have received SRF Board grants. Some of the projects for which the Tribes have sought funding have involved culvert inventory or repair, but others have not. Illustrating our shared strategy of gravel-to-gravel stewardship that takes into account all aspects of a

salmon's life, the Tribes have sought and been granted funding for projects to restore estuaries and side channels, and to enhance stream habitat by adding large woody debris and riparian vegetation. WDFW and the Washington State Department of Transportation have been involved with the Jamestown S'Klallam Tribe and others in a multi-year, multi-million dollar effort to restore Jimmycomelately Creek and the Lower Sequim Bay Estuary, with partial funding from the SRF Board. That project is expected to help in the recovery of Hood Canal Summer Chum salmon. See Exhibit N (Bates No. F0004340).

43. Local non-profit groups called Regional Fisheries Enhancement Groups (RFEGs) are also eligible for SRF Board grants. The Washington Legislature authorized the creation of Regional Fisheries Enhancement Groups in 1989. Additional legislation during the 1990s made RFEGs eligible for state and federal funding for salmon habitat enhancement and restoration projects. RFEGs have also obtained private funding. Fourteen RFEGs have been formed, including nine in the *United States v. Washington* Case Area. WDFW provides administrative and technical support. Staff from several *United States v. Washington* Tribes serve on RFEG boards, and RFEGs and Tribes have worked together on many projects, including fish passage barrier removal projects. The Regional Fisheries Enhancement Group Program Annual Report for 2006-07 (excerpts attached as Exhibit O) states that, over a period of twelve years, RFEGs had fixed 600 fish passage barriers and opened up 650 miles of fish habitat. Most of those projects were on private lands.

44. Degraded estuarine conditions have been identified as a major factor limiting salmon recovery in Puget Sound. (See Exhibit E page 33, Bates No. F0013137, and Exhibit N, Bates No. F0004332.) To address it, large-scale estuary-restoration projects are now underway in the Nisqually River Delta, the Skagit River Delta, and in the Skokomish River Delta in Hood Canal. A brochure that the United States Fish and Wildlife Service published about the restoration of the Nisqually River Delta is attached (Exhibit P). Because people recognized the importance of these projects, they put aside other salmon recovery projects to make sure these got started. The Nisqually, Swinomish, Upper Skagit, Sauk-Suiattle, and Skokomish Tribes have played a major role in the effort.

45. A related problem in Puget Sound is degraded nearshore conditions. (See Exhibit E page 33, Bates No. F0013137, and Exhibit N, Bates No. F0004332.) An estimated 80% of the Puget Sound nearshore is no longer functional for salmon. Under my direction, WDFW joined with the United States Army Corps of Engineers in 2001 as the necessary non-federal sponsor, and then added others to convene the Puget Sound Nearshore Partnership. Its mission is to build and implement an ecosystem-based restoration strategy for the badly-damaged nearshore environment of Puget Sound. We were joined by other state and federal agencies, local governments, the Northwest Indian Fisheries Commission, tribal governments, businesses, and others. The Partnership has sponsored a multi-million-dollar study of the function of the nearshore environment. The results are being used to identify

restoration and protection actions across 2,500 miles of the Puget Sound nearshore. The Corps of Engineers is expected to use the information to advance large-scale projects beyond the existing capacity of regional programs and authorities.

46. Beginning in 2006, the Washington State Legislature has appropriated funds for Estuary and Salmon Restoration in Puget Sound to assist the work of the Puget Sound Nearshore Partnership. More than $20 million has been granted to dozens of projects that will provide 3,500 acres of restored habitat spanning all ten Puget Sound counties. Recipients have included the Lummi, Swinomish, Tulalip, and Nisqually Tribes.

47. Salmon habitat restoration is a priority regionally as well as in Washington State. During the 1990s, it became clear to Canadians and Americans that their shared Pacific Northwest salmon runs could not be restored to optimum production through fishing restrictions alone. Recognizing the need to address non-fishing factors, Canada and the United States added a "Habitat and Restoration" provision to the Pacific Salmon Treaty in 1999 (attached as Exhibit Q). It emphasizes the importance of protecting and restoring salmon habitat and water quality as well as restricting fisheries, and thus directs the Pacific Salmon Commission to examine non-fishing factors that affect salmon production. In 2006, the Commission agreed to establish a Habitat and Restoration Technical Committee to do that work (Exhibit R). The Commission is currently developing a charter for that committee.

48. In 2007, the Pacific Salmon Commission directed an Ad Hoc Habitat Scoping Committee to prepare a report on the salmon habitat activities carried out by Canada and the United States since 1999. I co-chaired that committee, which also included members from the Columbia River Intertribal Fish Commission. We produced a report, which is attached as Exhibit S. It describes the variety of habitat restoration efforts in both countries, featuring some case studies. One of those is the Skagit River Estuary Restoration at Deepwater Slough, a joint project of the Swinomish and Sauk-Suiattle Tribes, WDFW, and the United States Army Corps of Engineers. It is designed to increase habitat for juvenile Chinook salmon, and, according to tribal monitoring data, it appears to be successful. Another case study is the removal of Goldsborough Dam described above in Paragraph 37.

49. The 1999 revisions to the Pacific Salmon Treaty also set up two endowment funds to be used for habitat restoration and other projects in the United States and Canada. Monies from the Southern Boundary Restoration and Enhancement Fund, or "Southern Fund," have been distributed to Tribes, Regional Fisheries Enhancement Groups, WDFW, and other organizations. Between 2004 and 2008, the Southern Fund distributed nearly $5.5 million in grants for projects in Washington and Oregon, including nearly $1 million to *United States v. Washington* Tribes and tribal organizations for projects such as the Nisqually Estuary Restoration, and for salmon stock assessments in northern Puget Sound. No distributions will be made in 2009, however. The Southern Fund is not immune from the

current global economic downturn, and the value of its corpus has fallen below the original invested amount.

50. In 2007, the Washington Legislature created the Puget Sound Partnership, whose mission is to restore the Puget Sound ecosystem to health by 2020, and to implement the Puget Sound Salmon Recovery Plan. In December 2008, the Puget Sound Partnership released an Action Agenda that the Puget Sound Tribes helped to develop. The focus of the Action Agenda is broad. It proposes actions to protect and preserve the natural functions that we still have in the Puget Sound region, restore what we can, and reduce sources of water pollution. The Action Agenda identifies dozens of state, tribal, local, federal, and Canadian entities with a role in implementing the actions, and it includes a funding strategy. These efforts have the goal of a healthier Puget Sound that can produce and sustain more juvenile salmon and other creatures.

III. Coupling Habitat Restoration with Hatchery and Harvest Reform: A Successful Model for Healthy Salmon and Sustainable Fisheries

51. In my opinion, wild salmon can thrive on a sustainable basis only if we support them through their entire lifecycle, in a "gravel-to-gravel," science-based approach to recovery. The public's financial resources are limited, and I have already observed "salmon funding fatigue" among Congressional staffers. In my opinion, it would be a mistake to focus narrowly on only one factor affecting salmon, such as state-owned fish-blocking culverts. If juvenile salmon cannot find functional shelter in the estuary as they

adapt to salt water, they die—as was determined for the Skagit River. If they cannot find cool, unpolluted freshwater for migration and spawning, they die—as was determined for the Fraser River. If adult salmon are caught in excessive rates, the stock will not recover—as was determined for the Nooksack spring Chinook. If hatchery-origin salmon spawn at excessive rates with wild fish, the stocks suffer genetic harm. Fixing state-owned culverts alone will do little to solve these other, very real, bottlenecks to recovery.

52. Nor will fixing state-owned culverts alone sustain salmon fisheries, tribal or non-tribal. I believe that an ESA-compliant federal, state, and tribal hatchery system will be the backbone of any strategy for maintaining or increasing Chinook catches in the Puget Sound region. We cannot achieve that without funding for hatchery reform. The alternative is to cut hatchery production, with resulting cuts in fisheries. Fishermen can take nearly 100% of hatchery-origin Chinook, but future harvest rates even on healthy stocks of wild Chinook may not exceed 20-40% for many recovered stocks. We can never return to the excessive 60-80% wild harvest rates that helped put Puget Sound Chinook on the threatened species list, no matter how many culverts are fixed.

53. Within the habitat arena, culverts are not even on the list of major factors limiting Hood Canal Summer Chum salmon recovery (see Exhibit N, Bates No. F0004338). Even so, statewide, we have made more and faster progress in fixing fish passage barriers than we have in addressing other major habitat factors that affect salmon, thanks in part to the hard work of local watershed groups (Exhibit E,

pages 24, 29; Bates Nos. F0013128, F0013133). We have already fixed the easiest and cheapest fish passage barriers, and those that remain will be more difficult and expensive. In my opinion, our goal should be to address all factors on parallel tracks to the extent we can, including fish passage barriers. If we funnel inordinate amounts of money into fixing state-owned culverts while ignoring how they fit into the whole picture of the salmon life cycle, we will surely create choke points in other places, possibly prolonging salmon recovery.

54. Our experience in the Columbia River shows that spending money on only one or a few factors affecting salmon leads to failure. Billions of dollars have been spent on fish and wildlife restoration in the Columbia River Basin. Despite these expenditures, the abundance of wild salmon and steelhead populations has not recovered to the target goals set by the Northwest Power and Conservation Council. The Hatchery Scientific Review Group (HSRG), which recently completed its review of Columbia River Basin hatchery programs, has urged a holistic salmon recovery approach. In its analysis of Lower Columbia River Coho, the HSRG concluded that the benefits of habitat improvements would more than double if combined with hatchery reforms. Unless hatchery and harvest reforms are implemented, the potential benefits of current or improved habitat cannot be fully realized. (Exhibit T page 5; Exhibit U page 13.)

55. The new Chinook agreement between the United States and Canada (Exhibit M) recognizes the need for a broad, integrated approach to salmon recovery in both countries. It states that "successful

Chinook conservation, restoration, and harvest management depends on a sustained and [internationally] coordinated program of resource protection, restoration, enhancement and utilization." In agreeing to set up a joint Habitat and Restoration Technical Committee (Exhibit R), the United States and Canada have promised to work together in planning how to integrate all factors necessary to help salmon survive and thrive in the *United States v. Washington* Case Area and regionally.

56. As shown in the attached "H-integration" diagram (Exhibit V), everything is connected when it comes to salmon. In the past, poor land use degraded habitat, and the wild salmon declined. Hatcheries were built to replace both. People who caught the more abundant hatchery fish took too many wild fish, and the wild salmon declined some more. Uncaught hatchery fish crowded the spawning grounds, and the outcompeted wild salmon declined still more. The gravel-to-gravel cycle was broken. My vision for the future is to reconnect the pieces. In restored freshwater and estuarine habitats, wild salmon will increase, and hatcheries will function as nurseries for wild salmon. Fisheries will target hatchery-origin fish while sparing wild fish. Wild salmon will thrive on the spawning grounds. The wild salmon will be healthy, and fisheries, catching both hatchery-origin and wild salmon, will be sustainable. Only if we reconnect all of the pieces in the gravel-to-gravel cycle can that happen.

57. We are reconnecting those pieces in the *United States v. Washington* Case Area. The integrated, collaborative, bottom-up salmon recovery approach we now have in place is the first time such

an approach has been tried, thanks in large part to the close working relationship between WDFW and the Tribes. While this Subproceeding has been pending, WDFW, the Tribes, other state agencies, local governments, citizen groups, and individuals have expended countless hours developing ecosystem-focused, science-based strategies to increase the number of salmon available in fisheries in the *United States v. Washington* Case Area. A lot of money has already been well spent as we are beginning to see signs of success. As NOAA Fisheries has cautioned, however, "the most pervasive risks to improved status of listed salmon require long and difficult efforts to correct, and many actions geared toward reducing the likelihood of extinction still require relatively long periods of time for their positive effects to become noticeable." (Exhibit D, page 5-45; Fates No. F0009883.) The integrated strategies we have developed and thus far funded to address the complete life-history of wild salmon will take decades to fund and fully implement throughout the *United States v. Washington* Case Area. In my opinion, they should continue to be given the chance to build healthy fish populations and sustainable fisheries.

I declare under the penalty of perjury that the foregoing is true and correct.

Executed on this *31st* day of March, 2009, at Olympia, Washington.

s/Jeffrey P. Koenings
JEFFREY P. KOENINGS, PH.D.

EXHIBITS TO THE DECLARATION OF JEFFREY P. KOENINGS, Ph.D

Exhibit A
Resumé of Jeffrey P. Koenings, Ph.D.

Exhibit B
Cover page, Section 1.1, and Figures 7 and 8 from *United States v. Washington* Joint Exhibit 2a, *Joint Statement Regarding the Biology, Status, Management, and Harvest of the Salmon and Steelhead Resources of the Puget Sound and Olympic Peninsular Drainage Areas of Western Washington* (May 14, 1973)

Exhibit C
Excerpt from the *Washington Statewide Strategy to Recover Salmon: Extinction is Not An Option—Summary* (State of Washington Governor's Salmon Recovery Office, September 1999) (Cover pages and pages II.11 – II.21; Bates Nos. H00002844 - H00002846 and H00002863 – H00002873)

Exhibit D
Endangered Species Act Section 7(a)(2) Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation: Consultation on the Approval of Revised Regimes under the Pacific Salmon Treaty and the Deferral of Management to Alaska of Certain Fisheries Included in those Regimes (National Marine Fisheries Service, December 22, 2008) (Bates Nos. F0009795 – F0010216)

Exhibit E
Excerpt from 2008 State of Salmon in Watersheds: Salmon Recovery Act 10th Anniversary (State of Washington Governor's Salmon Recovery Office,

2009) (Bates Nos. F0013103 – F0013157 and F0013197 – F0013202)

Exhibit F
Salmonid Stock Inventory 2002 Summary Tables for stocks originating from the *United States v. Washington* Case Area and Willapa Bay (Washington Department of Fish and Wildlife 2002)

Exhibit G
Declaration of Keith Lutz in Support of Tribes' Motion for Summary Judgment (*United States v. Washington* Doc. No. 18564; Subproceeding 01-1 Doc. No. 299)

Exhibit H
Testimony of Jeffrey P. Koenings, Ph.D., Director, Washington Department of Fish and Wildlife, to the United States Senate Commerce, Science and Transportation Committee Field Hearing, Seattle, Washington, May 27, 2008 (Bates Nos. F0013264 – F0013270)

Exhibit I
Testimony to the Washington State House of Representatives Capital Budget Committee, January 22, 2004, by Bill Ruckelshaus, Chair, Salmon Recovery Funding Board, Jeff Koenings, Director, Washington State Department of Fish and Wildlife, and Bob Nichols, Senior Advisor, Office of the Governor (Bates Nos. F0013256 – F0013263)

Exhibit J
Jeffrey Koenings, *Fish Recovery Needs State Nurture Not Just Mother Nature*, Seattle Post-Intelligencer, April 27, 2003 (Bates Nos. F0013253 – 0013255)

Exhibit K
Jeffrey P. Koenings, Ph.D., *Salmon Recovery Comes of Age*, Seattle Post-Intelligencer, December 12, 2008 (Bates Nos. F0008269 – F0008271)

Exhibit L
Pie charts showing *Average Annual Chinook Catch Size & Composition, 2002-2006; Number of Chinook, by Pacific Salmon Treaty Management Area*

Exhibit M
Pacific Salmon Commission final agreement regarding Annex IV, Chapter 3 Chinook, to the Pacific Salmon Treaty, with letter of transmittal to the governments of the United States and Canada (May 21, 2008)

Exhibit N
Excerpts from *Statewide Strategy to Recover Salmon: Responding to Federal Endangered Species Act Listings "The Washington Way"* (State of Washington Governor's Salmon Recovery Office, 2006) (Cover page and pages 12-21; Bates Nos. F0004318, F0004331 – F0004340)

Exhibit O
Excerpts from the Regional Fisheries Enhancement Group Program *Annual Report for July 1, 2006 – June 30, 2007* (Washington Department of Fish and Wildlife 2007) (Bates Nos. F0013907 – F0013908, F0013910 – F0013911, F0013914)

Exhibit P
United States Fish and Wildlife Service, *Summary of the Comprehensive Conservation Plan for Nisqually National Wildlife Refuge*, May 2005 (Bates No. USFWS_SUPP022500 CD)

Exhibit Q
Treaty Between the Government of Canada and the Government of the United States of America Concerning Pacific Salmon, Attachment E, "Habitat and Restoration"

Exhibit R
Pacific Salmon Commission, "Proposal for a Habitat and Restoration Technical Committee" (adopted February 2006)

Exhibit S
Pacific Salmon Commission Ad Hoc Habitat Scoping Committee, *An Overview of Salmon Habitat and Restoration Related Activities in Canada and the United States 1999 – 2006, Pacific Salmon Commission Technical Report No. 24* (2008) (Bates Nos. F0008491 – F0008517)

Exhibit T
Memo from Hatchery Scientific Review Group to Columbia River Hatchery Reform Steering Committee (January 14, 2008)

Exhibit U
Hatchery Scientific Review Group, *Columbia River Hatchery Reform System-Wide Report*, Part 3.2-Coho ESUs (February 2009)

Exhibit V
Two-page chart H-Integration, Past and Future

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No. 17-269

In The
Supreme Court of the United States

STATE OF WASHINGTON,

Petitioner,

v.

UNITED STATES OF AMERICA, ET AL.

Respondents.

ON WRIT OF CERTIORARI
TO THE UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

JOINT APPENDIX – VOLUME II OF III

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PETITION FOR CERTIORARI FILED AUGUST 17, 2017
CERTIORARI GRANTED JANUARY 12, 2018

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NOTE: The following documents were reprinted in the Petition Appendix.

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Order And Amended Opinion 58a
No. 13-35474 (9th Cir. June 27, 2016,
amended Mar. 2, 2017) (Docket No. 139)

Memorandum And Decision 127a
No. CV 70-9213 (W.D. Wash. Mar. 29, 2013)
Subproceeding 01-01 (Document 752)

Supplement To Memorandum And Decision 180a
No. CV 9213 (W.D. Wash. Apr. 1, 2013)
Subproceeding 01-01 (Document 755)

Permanent Injunction Regarding
Culvert Correction 235a
No. C70-9213 (W.D. Wash. Mar. 29, 2013)
Subproceeding 01-01 (Document 753)

Order On Motions In Limine 243a
No. CV 9213RSM (W.D. Wash. Oct. 8, 2009)
Subproceeding 01-01 (Document 607)

Order On Cross-Motions For
Summary Judgment 249a
No. CV 9213RSM (W.D. Wash. Aug. 22,
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- State - Partial (4)
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Streams

State Highways

Data Sources:

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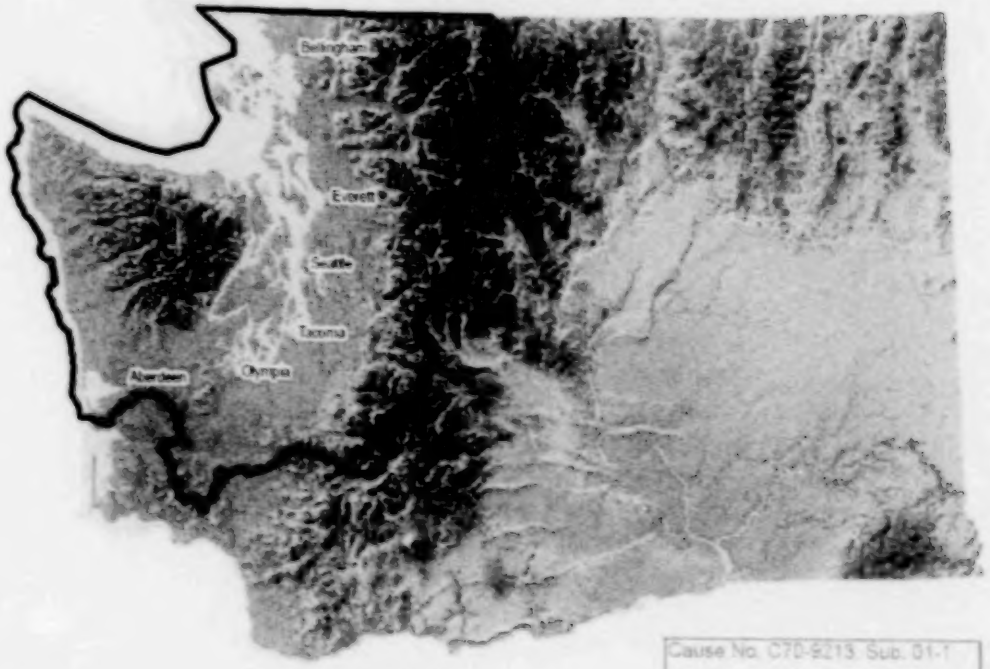
Streams - Washington State Watercourse Hydrography (DNR, 8/01/2008)

State Highways - State Routes of Washington State (WSDOT, 10/6/2010)

N
W E
S

0 0.5 1 1.5
Miles

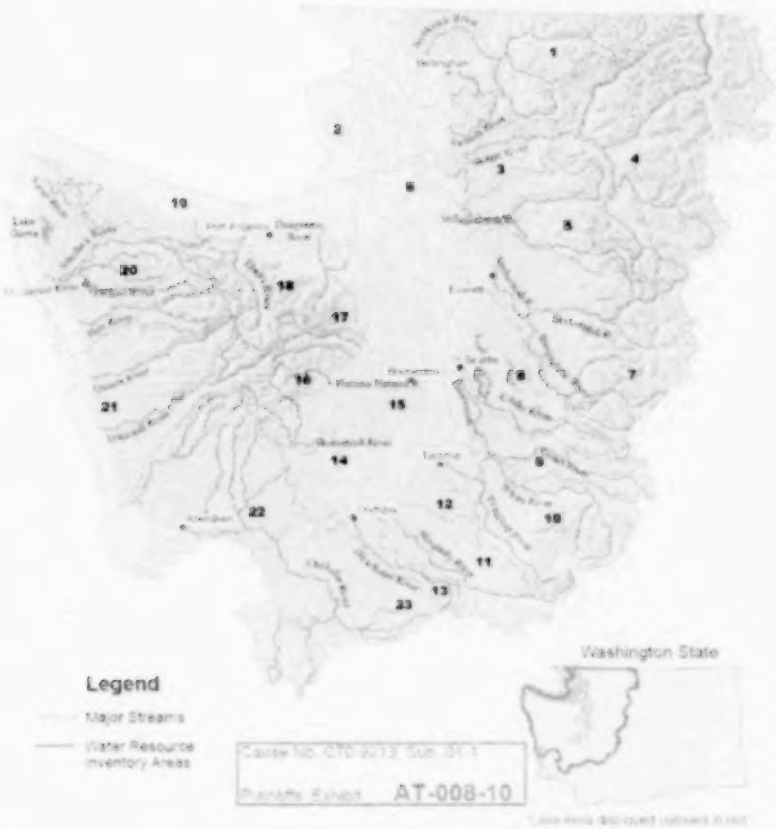
United States v Washington Case Area



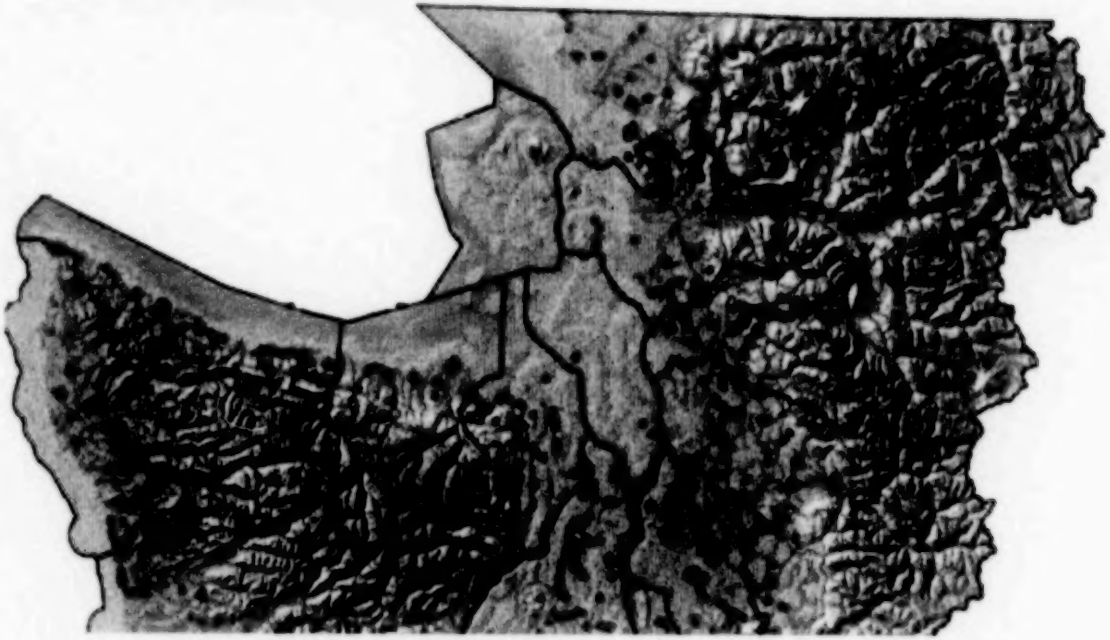
Cause No. C70-9213 Sub. 01-1

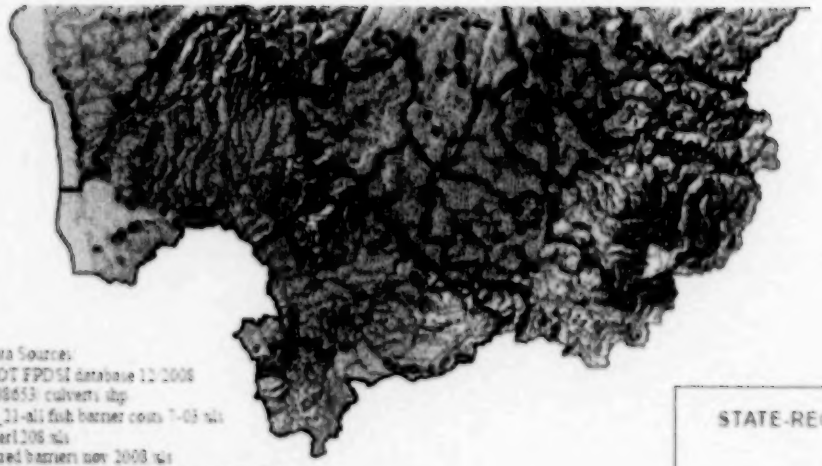
Plaintiffs' Exhibit AT-008-9

Water Resource Inventory Areas 1 - 23



Washington State Barrier Culverts in U.S. v. WA. Case Area





Culvert Data Sources:
WDFW DOT FPDSI database 12 2008
DNR R0008653 culverts shp
DNR PS-3_21-all fish barrier coun 7-03 wk
DNR barrier1206 wk
DNR repaired barriers nov 2008 wk
Note: 1) Map does not depict anadromous barriers from the WA State Parks Dept or other state agencies not in the FPDSI/DNR provided databases. 2) "Unknown" means barrier status is "Unknown" in the provided dataset. 3) Due to overlapping of culvert points at this mapping scale, one might not see all of the 1497 barriers on this map.

Cause No. C70-9213, Sub. 01-1
Plaintiffs Exhibit AT-008-4

20 10 0 20 40 60
Miles

STATE-RECORDED

Anadromous Culvert Status

- State Owned Barrier Culvert (1497)
- Selected Streams
- WRIA Boundary

12887

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The Honorable Ricardo S. Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, Defendant.	NO. C70-9213 Subproceeding No. 01-1 (Culverts) DECLARATION OF PAUL SEKULICH, PH.D., IN LIEU OF DIRECT TESTIMONY

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I, PAUL SEKULICH, Ph.D., declare as follows:

1. I am a fisheries biologist with over thirty years of professional experience in salmon habitat and fisheries issues in the State of Washington. My Curriculum Vitae is attached as Exhibit A.

2. I hold a Bachelor of Science in Fishery Biology from Colorado State University. After military service, I returned to that university and earned a Master of Science in Fishery Biology. In 1980, I completed the requirements for a Doctor of Philosophy degree in Forestry Science-Fisheries at

the University of Idaho. For my doctoral dissertation, I analyzed factors affecting the carrying capacity of Idaho forest streams for rearing juvenile chinook salmon. My dissertation has been cited by other state, tribal, and federal scientists studying salmon in Idaho.

3. I joined the Washington Department of Fisheries (WDF) in 1977. For two years, I worked as a Fish Biologist with progressively greater responsibility managing treaty Indian and non-Indian salmon net fisheries in Puget Sound. In 1979, I was promoted to Assistant Chief of the Harvest Management Division in the WDF Planning, Research, and Harvest Management Program. I held that position for over 11 years. I oversaw salmon fisheries management in Puget Sound. My staff and I worked through some difficult issues as we learned how to manage fisheries in accordance with court orders in *United States v. Washington*.

4. In 1991, I moved from salmon harvest management into salmon habitat work. I spent 12 years supervising the Environmental Restoration Division in what is now the Washington Department of Fish & Wildlife's (WDFW's) Habitat Program. My staff included environmental engineers, biologists and construction workers who specialized in salmonid habitat. We planned, constructed, and evaluated fish habitat projects across the state, and provided technical assistance to support state, local, and federal initiatives to maintain and restore wild salmonids and their habitat. More specifically, we planned and built fish habitat enhancement and restoration projects, inventoried and removed stream obstructions and unscreened water diversions,

inspected and maintained fishways and screened water diversions, developed and maintained a statewide fish passage and water diversion database, and conducted research.

5. I retired from state service in December 2002. I am still involved in salmonid habitat issues, however. Since April 2005 I have worked as a private contractor with WDFW and the Washington State Department of Transportation in matters involving fish passage and other environmental problems affecting salmonids in Washington State.

I. Fish Passage in Washington Before 1990

6. Under Washington State law, RCW Chapter 77.55, anyone who undertakes a construction project in state waters must obtain a hydraulic project approval (HPA) from WDFW. Under RCW 77.57.30, an obstruction in a stream must be provided with a fishway, or fish passage device, approved by WDFW. The HPA law has been on the books since 1943; the fish passage law has been around since the nineteenth century. Before 1990, however, WDFW and its predecessors had no formal program linking HPA applications with fish passage barriers. Staffing levels were sufficient to process HPA applications but not to promote the program. Field habitat biologists who noted fish passage barriers reported them to the Olympia office. Only the most obvious fish passage problems, such as "perched" culverts with large outfall drops, were recorded. Gradually, a database called "Unresolved Fish Passage Problems" was developed. Biologists also conducted yearly inspections of fishways they knew about, and kept a separate database to help them track the owners' compliance

with maintenance directives. Neither of these databases was comprehensive.

II. Systematic Culvert Inventories and Correction Projects Began in the Early 1990s

7. In 1990, WDFW began taking a more systematic approach to hydraulic project approvals and fish passage. Because highways cross streams and other water bodies, HPAs are usually required for highway construction and maintenance projects. State law also requires that highway culverts be passable to fish. It became apparent that we could be more efficient, and do a better job of protecting fish, if we put those two things together. My predecessors, and staff at the Washington State Department of Transportation (WSDOT), decided to incorporate fish passage into our planning on HPAs issued for WSDOT activities. As a result, the agencies executed a Memorandum of Understanding in 1990 (Exhibit B). Among other things, they agreed to conduct an inventory of fish passage barriers on WSDOT rights-of-way. The 1991 Washington Legislature appropriated funds for WSDOT to remove six known fish passage barriers, and to work with what is now WDFW to identify additional fish passage barriers and prioritize them for removal (Exhibit C). Later that year, WSDOT and the Washington Department of Fisheries executed a second agreement to perform a statewide fish passage inventory and develop plans to remove fish passage barriers (Exhibit D). Nearly two decades later, WDFW and WSDOT continue to work together to identify fish passage barriers in the state highway system, prioritize them for correction, and fix them.

8. In nearly every year beginning in 1992, WSDOT and WDFW have published progress reports describing their fish passage barrier inventory and correction work on state highways. I was involved in preparing those that were published before I retired in December 2002, eleven reports in all. The Tribes cited our first three reports in Paragraph 3.6 of their January 2001 Request For Determination that started this Subproceeding.

9. We knew that WSDOT culverts were not the only ones that block fish passage. During the early 1990s, WDFW also reached out to local governments to help them with fish passage problems on their roads. WDFW conducted or helped with culvert inventories in four counties within the *United States v. Washington* Case Area—Jefferson, Thurston, Skagit, and Kitsap—and fixed several high priority county culverts under a cost-sharing arrangement. WDFW also did other cooperative fish passage work with several other counties in Western Washington.

10. Because fish get the most benefits when all fish passage barriers in a watershed are fixed at the same time, WDFW sought to include nearby private fish passage barriers within the same construction project when it fixed state and county culverts. Our ability to do that was limited by financial and staffing resources, however.

11. As we gained experience in fish passage work during the early 1990s, we developed a plan for sequencing the work that is still used today by WDFW: (1) Find and evaluate the culverts that block fish passage; (2) Record the information in a database; (3) Prioritize the culverts for correction so as to get the

most "bang for the buck;" (4) "Scope" each correction project; that is, evaluate the site and possible fish passage solutions; (5) Design a suitable structure that will achieve fish passage; (6) Install it; and (7) After construction, monitor it to see whether it worked.

III. Finding, Prioritizing, and Fixing Culverts that Block Fish Passage

A. Inventory: Finding and Evaluating Culverts that Block Fish Passage

12. In accordance with the 1991 legislation about WSDOT culverts (Exhibit C) and the newly-executed agreements between WSDOT and WDF (Exhibits B and D), the Washington Department of Fisheries organized a new fish passage inventory section to conduct a systematic inventory on WSDOT rights-of-way. It started its work in 1991 under my supervision.

13. When the WSDOT culvert inventory got started in 1991, the Washington Departments of Fisheries and Wildlife were separate agencies. Fisheries was in charge of salmon. Wildlife was in charge of steelhead and most other fish that live in fresh water. Because Fisheries was conducting the culvert inventory, it looked only for barriers to salmon passage. At that time, streams with a gradient of more than 7% were considered too steep for salmon, so WDF did not look for culverts in streams steeper than that. In 1994, the two agencies merged into a single Washington Department of Fish and Wildlife (WDFW). After that, culvert inventories expanded to include all salmonids, not just anadromous salmon. First, in 1995, the inventories expanded to include steelhead by going to steeper stream gradients, up to

12%. Then, in 1998, when the Washington Forest Practices Board drafted new forest practices rules, the inventories expanded again to include nonanadromous, "resident" fish that live in steeper streams up to a 20% gradient.

14. As described in the first report that WDF and WSDOT published on the WSDOT culvert program (excerpts attached as Exhibit F), the culvert inventories started in the north central Puget Sound region. To decide the order in which the inventory crews would visit regions around the state, we looked at the number of road miles in each region, the number of expected stream crossings, the number of fish species present, and fish stock status. These inventories are "road-based." Using stream maps, highway maps, and their own eyes, two people in a truck drive the roads and look for streams and culverts, stopping when they arrive at a likely location. It can be dangerous when there is a lot of traffic and no shoulder. Crews clamber down to the stream to take measurements. It is slippery work, with plenty of blackberries, devil's club, and stinging nettles in the way. The crews record what they find in their field notes and move on to the next site, day after 10-hour day, in all kinds of weather.

15. Before 1998, inventory crews relied on subjective professional judgment to determine whether salmonids could get through a culvert. (See Exhibit F, Bates No. T1000011.) They considered site conditions such as hydraulic drop (e.g., whether the culvert was "perched" above the streambed), culvert slope, water depth, and velocity. "Professional judgment" is not easily taught, however, and my staff and I decided we needed to create a standardized

method that other people could be trained to use. We developed a standard fish passage barrier assessment protocol, and published it in 1998 in a manual entitled *Fish Passage Barrier Assessment and Prioritization Manual*. As updated in 2000, the WDFW culvert assessment manual is attached as Exhibit E. The WDFW protocol is now widely used throughout the Pacific Northwest. For more information about WDFW's fish passage barrier assessment manuals, please refer to the Declaration of Michael R. Barber.

16. The WDFW barrier assessment protocol has two parts: Level A and Level B. Level A is a basic assessment that can be done onsite. The inventory crew takes measurements of the culvert and the stream, and looks inside the culvert to see whether streambed material is present. Sometimes, this is enough for the crew to determine on the spot whether fish can get through the culvert. (See Exhibit E, pages 11-12, 14-17; Bates Nos. USFWS 000890 – USFWS 000891, USFWS 000893 – USFWS 000896.) The crew may use professional judgment to gauge whether the culvert blocks fish passage completely, or only partially. (See Exhibit E page 12, Bates No. USFWS 000891.) They make a rough estimate of the extent of impassability, assigning the designations full barrier (90-100%), two-thirds barrier (50-90%), one-third barrier (10-50%), or no barrier (0-10%).

17. If the results of the Level A analysis are inconclusive, the crew takes additional measurements for a Level B analysis. A Level B analysis calculates water velocity inside the culvert under certain conditions. If the calculated velocity exceeds the value for adult trout in Table 1 of Section 220-110-070 of the Washington Administration Code (Exhibit E

Appendix B, Bates No. USFWS 000985), the culvert is considered to be a barrier to fish passage.[1] The idea behind this method is that, if fish are not strong enough to swim upstream against fast-moving water inside the culvert, they will not be able to get through it, though some fish may still get through. WDFW crews used the Level A/Level B method to determine the passability of nearly all of the WSDOT culverts that the crews examined statewide.

18. If a culvert blocks fish passage, the next step is to determine how much fish habitat it blocks. When looking for culverts, the inventory crews perform basic habitat assessments. If the crew can tell right away that a culvert blocks fish passage, the crew makes a "threshold determination" of whether it blocks a significant amount of habitat. The crew walks 200 meters up- and downstream looking for natural fish passage barriers, such as natural waterfalls or sustained stream gradients exceeding 20%. If there are no natural fish barriers within 200 meters of the culvert, the crew concludes that the culvert blocks more than 200 meters of habitat. WDFW judges 200 meters to be significant, so the culvert is put on the list for further evaluation. (See Exhibit E page 36, Bates No. USFWS 000915.)

19. My staff and I developed methods for determining the amount and quality of fish habitat

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[1] For more about WAC 220-110-070, please refer to Paragraph 48 below, and to the Declaration of Robert Barnard, P.E.

blocked by culverts so that we could generate prioritized lists of culverts to be fixed. Once a culvert is determined to block more than 200 meters of habitat, it gets scheduled for a more in-depth habitat assessment under one of the methods described in the WDFW culvert assessment manual. (See Exhibit E pages 29-54, Appendix A Physical Habitat Survey Field Form, and Appendix F; Bates Nos. USFWS 000908 – USFWS 000933, USFWS 000978 – USFWS 000979, and USFWS 001013 – USFWS 001015.) Habitat assessment crews visit each culvert, walk the stream, take measurements, and record their observations. This work can be dangerous, tedious, and very physically demanding. Sometimes, landowners are unwilling to let the crews enter their land to do the work. Habitat information that the crews collect is recorded, along with other information, so that the culvert can be evaluated and compared with other culverts in the prioritization process described below.

B. Recording the Information in a Computer Database

20. Until the late 1990s, WDFW maintained several independent computer databases related to fish passage. As information from culvert inventories began accumulating and data technology improved, my staff and I knew we needed a centralized, standardized way to record it. In 1998, Brian Benson of WDFW developed such a database, now called the Fish Passage and Diversion Screening Inventory (FPDSI) database. It primarily supports WDFW's inventory efforts on WSDOT rights-of-way and

WDFW-owned lands,[2] and it has also been a repository for inventory information collected by recipients of culvert inventory grants. The database now has many thousands of entries. For information about the current status of the FPDSI, please refer to the Declaration of Michael R. Barber.

C. Deciding Which Culverts to Fix First Using the Fish Passage Priority Index

21. The collective wisdom of fisheries biologists is that efforts to protect and restore wild salmonid populations can best succeed if we schedule habitat and fish passage restoration projects in the most cost-effective manner so as to maximize fish benefits. How do we measure and compare the fish benefits from fixing blocking culverts? It seemed to me in the early 1990s that we needed a "common currency" that could be applied to every potential culvert project statewide. By incorporating many relevant factors into a single, standardized index number, we could develop a tool for comparing the relative benefits of correcting different fish passage barriers in different watersheds or within a single watershed. Values unique to a particular project, such as its connection to another project, could be incorporated as "value-added parameters" if desired, but would not be part of the index number itself.

22. I advanced the "single number concept" with the Priority Index (PI) methodology for fish

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[2] For information about culvert inventories on lands owned by the Washington Department of Fish and Wildlife, please refer to the Declaration of Michael R. Barber.

passage projects. My staff and I developed the Fish Passage Priority Index in 1991 as a way to implement the 1991 legislation that launched the WSDOT culvert program (Exhibit C). We first published it in the 1992 progress report on the WSDOT program (Exhibit F, Bates No. T1000015). It was later published in the 1998 and 2000 WDFW culvert assessment manuals. It is still widely used today.

23. The PI for each fish passage project is a numeric indicator giving each project's relative priority with respect to other projects. This *relativism* is crucial. The PI works because it provides a general, objective framework for overall prioritization. The PI incorporates a variety of factors, and no single factor for any individual species dominates.

24. The PI equation looks complex, but it is logical, and it works. Here it is:

$$PI = \sum_{\text{all species}} \sqrt[4]{[(BPH) \times MDC]}$$

Where:

PI = Fish Passage Priority Index number for a particular project, indicating the relative benefit of the project considering cost.

$\sum$ = A mathematical symbol indicating that individual values are to be summed. The overall project PI is the sum ($\Sigma_{\text{all species}}$) of individual PI values calculated for each species present in a stream (e.g., PI_{coho} is added to PI_{chum} to obtain $PI_{\text{all species}}$).

$\sqrt[4]{}$ = Quadratic root symbol. The quadratic root is used because otherwise the equation would generate an unwieldy range of gigantic numbers.

B = Proportion of passage improvement achieved from a particular culvert correction project—roughly reflects whether the culvert is a partial or total barrier to fish passage and gives greater weight to projects that would correct total barriers. See Paragraph 16 above for more.

P = Annual adult fish production potential per m^2 of habitat opened up if the culvert were fixed – gives greater weight to projects that have the potential to produce the most fish. Each species has its own "P."

H = Habitat gain in square meters (m^2) – the amount of habitat that would be opened up if the culvert were fixed – gives greater weight to projects that would open up more habitat.

M = Mobility Modifier – gives greater weight to projects that would open up habitat for anadromous species.

D = Species Condition Modifier – gives greater weight to less healthy species.

C = Cost Modifier – gives greater weight to less costly projects. Anything over $500,000 is considered to be a high cost project.

The P and H factors are discussed in greater detail below. For more detail about the other factors, see Exhibit E, pages 55-57 (Bates No. USFWS 000934 – USFWS 000936).

25. **The P Factor.** The P factor estimates the number of adult fish that could *potentially* be produced annually by the habitat made available by correction of the passage barrier. It is not intended to predict the number of fish that *would* be produced. My staff and I chose standard "P" values for each salmon species by examining the scientific literature that was available in the early 1990s. Most of it was based on research done in the 1970s and 1980s. (See Exhibit F, Bates Nos. T1000060 – T1000061.) We added "P" factors for steelhead and trout later in the 1990s after the merger of the Washington Departments of Fisheries and Wildlife. The following table shows the "P" factors for salmon and steelhead that are currently used in the Fish Passage Priority Index. (See Exhibit E, pages 55-56; Bates Nos. USFWS 000934 – USFWS 000935.)

Salmon and Steelhead "P" Factors Used in the Fish Passage Priority Index		
Species	**Type of Habitat**	**Methodology/Source**
Coho Salmon	Rearing	(0.5 coho smolts/m^2)(0.10 smolt to adult survival) = 0.05 coho adults/m^2 of rearing habitat
		See Exhibit F (Bates No. T1000060)
Chinook Salmon	Rearing	Spring/Summer Chinook: (0.5 spring/summer chinook smolts/m^2)(0.018 smolt/adult survival) = 0.009 spring/summer chinook adults/m^2 of rearing habitat

		Fall Chinook: (0.5 fall chinook smolts/m^2)(0.015 smolt/adult survival) = 0.0075 fall chinook adults/m^2 of rearing habitat
		Spring/Summer and Fall Chinook are combined for a composite chinook production of 0.016 chinook adults/m^2 of rearing habitat
		See Exhibit F (Bates No. T1000060)
Chum Salmon	Spawning	(0.5 female/m^2 of spawning habitat)(2500 eggs/female)(0.10 egg to fry survival)(0.01 fry to adult survival) = 1.25 chum adults/m^2 of spawning habitat
		See Exhibit F (Bates No. T1000061)
Pink Salmon	Spawning	(0.5 female/m^2 of spawning habitat)(2500 eggs/female)(0.10 egg to fry survival)(0.01 fry to adult survival) = 1.25 pink adults/m^2 of spawning habitat
		See Exhibit F (Bates No. T1000061)
Sockeye Salmon	Spawning	(3500 eggs/redd)(0.0025 egg survival to adult) = (8.75 adults/ redd)/2.9 m^2/redd = 3 sockeye adults /m^2 of spawning habitat
		See Exhibit F (Bates No. T1000061)
Steelhead	Rearing	(0.06 smolts/m^2)(0.035 smolt survival to adult) = 0.0021 steelhead adults/m^2 of rearing habitat
		See WDFW/WSDOT 1997 report to Legislature (app. XIII)

26. **The H Factor.** As described above in Paragraph 18, habitat assessment crews collect information about the habitat associated with each fish-blocking culvert. Habitat gain is expressed in square meters (m^2) of either spawning or rearing habitat. Spawning area is used for those species (chum, pink, and sockeye salmon) whose production is limited primarily by spawning habitat. Rearing area is used for those species (coho and chinook salmon, steelhead, and trout) whose production is limited primarily by rearing habitat. (See Exhibit E, pages 31-34 and Appendix E; Bates Nos. USFWS 000910 – USFWS 000913 and USFWS 001007 – USFWS 001012.) Spawning and rearing areas can be adjusted by a Habitat Quality Modifier, a subjective estimate of habitat quality to account for the decreased production potential of degraded streams. (See Exhibit E, pages 33, 38-39; Bates Nos. USFWS 000912, USFWS 000917 – USFWS 000918.) Data collected from habitat surveys are processed in a customized spreadsheet that generates a detailed report for each stream surveyed. (See Exhibit E, Appendix H; Bates Nos. USFWS 001019 – USFWS 001021.)

27. When fish species with similar freshwater life histories occupy the same habitat, they compete with each other, which tends to reduce the production of each species below what it would be without the competition. For example, coho and steelhead juveniles spend a lot of time in freshwater before heading to sea, and they compete for food and shelter. To adjust for that competition, my staff and I developed the species complex factor. It is used to reduce the habitat area (H) used in the Priority Index

formula. (See Exhibit E pages 39-40; Bates Nos. USFWS 000918 – USFWS 000919.)

28. Sometimes, there are multiple fish passage barriers on the same stream. But when we calculate a PI for a culvert, we assume it is the only barrier in the watershed because we don't know when the others might be fixed. So, when we calculate "H" for a culvert, we include all of the fish habitat upstream of the culvert, even though there may be other fish passage barrier culverts upstream.

D. Response to Tribal Use of the Fish Passage Priority Index

29. I understand that the Tribes in this Subproceeding have sought to use the "BPH" factors in the Fish Passage Priority Index to generate numbers of lost fish production and effects on fisheries from state-owned fish-blocking culverts. The PI was never intended to be used in that manner. We developed the PI solely as a tool to help decision-makers decide how to allocate limited funds when selecting fish passage projects. The PI uses standardized, generic production factors. That makes it a good tool for comparing the relative benefits of different projects, but a bad one for making predictions about fish production in particular streams. It is not an accurate method to predict actual salmon production upstream of fish-blocking culverts, or actual salmon harvest, and it is a misuse of the PI to use it for those purposes. The following paragraphs give some examples of why that is so.

30. **Double counting of habitat.** Sometimes, there are multiple state-owned fish passage barriers on the same stream. For each barrier, a

separate PI is calculated that assumes it is the only barrier in the watershed, as discussed above in paragraph 28. If there are four barriers in the watershed, and we add up the "potential" fish production from each one, we wind up counting some areas of the stream four times.

31. **Over-estimation of potential benefits.** Several factors may contribute to over-estimation of potential benefits of barrier correction. Among other things, these include:

- Presence of non-state-owned fish passage barrier culverts upstream or downstream of a state-owned barrier.
- Many areas upstream of partial blockages may already be fully seeded—that is, the fish are already getting past the partial barrier and spawning. Removing the barrier may not increase fish production.
- The "P" factors used in the PI are based on research from streams with shallow gradients, where fish production is highest. Fish production is less in streams with steeper gradients, such as we find on the Olympic Peninsula. Research by WDFW's Dave Seiler and others has shown that some watersheds are more productive than others.
- The "P" factors used in the PI assume that smolt-to-adult survival will be the same for every watershed in every year. That does not reflect reality. Many things affect the survival of young salmon as they grow to adulthood. For example, ocean conditions can have a huge

impact, as described in the Declaration of Jeffrey P. Koenings, Ph.D.

- The "P" factors used in the PI are based on standard production values for each species, but in particular stream systems the collective experience of biologists may suggest that lower values are more realistic. An example is sockeye salmon in Coal Creek, which flows into Lake Washington at Bellevue.

32. **Percent Passage Improvement ≠ Percent Fish Improvement.** As described above in Paragraph 16, crews conducting culvert inventories may make rough judgments about whether a culvert is a full or partial fish passage barrier. For partial barriers, they may estimate the extent of impassability, assigning the designations two-thirds barrier (50-90%), or one-third barrier (10-50%). The "B" factor in the PI equation, which represents proportion of passage improvement, relates to an approximate mid-point of those ranges. (See Exhibit E page 57, Bates No. USFWS 000936.) It is not intended to quantify the proportion of increased fish production that would result from a fish passage barrier correction, and I am aware of no evidence of a close correlation. The "B" factor is intended only to assist decision-makers in the prioritization model.

33. **Delay of fish use.** Sometimes, it can take years for salmon to find their way into newly-available habitat.

34. **Escapement goals.** Escapement goals—the number of fish that must get to the spawning grounds to sustain the run optimally—are based on the habitat available in the water-

shed. Fishery managers would need to increase escapement goals to account for the habitat opened up from fixing culverts. Fish needed for escapement would not be available for harvest.

35. **Habitat degradation.** The "P" factors used in the PI are based on high quality streams with ample fish habitat. Those numbers may not work for degraded streams or smaller streams. For example, WDFW research suggests that more sensitive species disappear from urban streams that get a lot of run-off from impervious streets and parking lots, and the only remaining salmonids are cutthroat trout or late-spawning chum salmon.

36. **Depressed stock status.** The "P" factors used in the PI are based on healthy fish stocks. For stocks in poor condition, such as those listed as threatened or endangered under the federal Endangered Species Act, there may not be enough spawners to use the stream habitat that is already available.

37. **Fisheries in Alaska and Canada.** Juvenile salmon from Washington rivers migrate to Canadian and Southeast Alaskan marine waters before reversing their migration and returning to Washington as adults. People fish for them in those waters, reducing the number that return to Washington. It is hoped that the new 2009-2018 chinook annex that has been negotiated under the Pacific Salmon Treaty will allow more Washington-origin chinook to return to Washington.

38. **Density Dependent Mortality.** Because of crowding and competition for food and shelter, increasing the production of juvenile fish can

decrease their freshwater or marine survival. The result may be little or no net increase in adult production even if we increase the juvenile production because we unblocked a culvert.

39. **Lack of full harvest.** Even where more salmon are produced when a fish passage barrier is removed, fishermen may be unable to catch them all because of factors such as:

- Low market prices for fish may make fishing uneconomical.
- Fisheries may be constrained to protect weak stocks mixed in with healthier stocks.
- Bad weather may keep fishermen home.
- Fish may arrive while fisheries are closed.
- Fishing opportunity is subject to court orders and state/tribal negotiations.

E. Scoping, Design, Construction, and Post-Construction Monitoring

40. For WSDOT culverts, the Fish Passage Priority Index formula typically generates PI numbers that range from 1 to 62. Other types of structures, such as dams, may generate higher numbers. In general, the higher a culvert's PI number, the higher the priority to fix the culvert. PI numbers are a valuable tool that decision-makers can use to compare culverts, but they do not in themselves dictate the order in which culverts are fixed. Assigning a PI number is just an initial step in deciding what to do about a fish passage barrier culvert. WDFW and WSDOT use a scoping process to make decisions about fish passage projects. In the

scoping process, biologists, engineers, and others consider practical factors such as construction feasibility or the presence of other blocking culverts. Challenging geology may be a reason to conduct a repair at an easier site first. Sometimes, culvert repair projects are selected so as to match costs with available funds. Projects may be spread around regionally to avoid overwhelming staff in one area, or concentrated in one area to be efficient. The aim is to get the greatest benefit from the resources available.

41. For more information about the scoping process and project inspection and monitoring, please refer to the Declaration of Michael R. Barber. For more information about culvert design, please refer to the Declaration of Robert Barnard, P.E.

IV. Fish Passage in Washington Since the Late 1990s

42. Beginning in the late 1990s, the whole environmental community recognized the importance of fish passage. This recognition translated to legislative attention, emphasis on resolving fish passage problems on all state-owned lands, and efforts to bring WDFW technical expertise to the public. For a description of what WDFW has done to address fish passage problems on its own lands, please refer to the Declaration of Michael R. Barber. Please refer to the Declarations of Michael R. Barber and Robert Barnard, P.E., for information about the work that WDFW has done to publish technical manuals and provide training and technical assistance to the public.

43. During the late 1990s, the Washington State Legislature enacted several key bills that

addressed fish passage and other environmental issues. A 1997 enactment directed WSDOT and WDFW to convene a Fish Passage Task Force with Tribes, local governments, businesses, and environmental groups. I co-chaired that Task Force with Paul Wagner from WSDOT. We presented a report to the legislature in December 1997 with recommendations for better coordination, training, funding, and permit streamlining for fish passage projects.

44. The Legislature adopted some of our recommendations in 1998, along with other salmon recovery measures. Most of the legislation is currently codified in Chapters 77.85 and 77.95 of the Revised Code of Washington. Please refer to the Declaration of Jeffrey P. Koenings, Ph.D., for more about salmon recovery efforts in Washington.

45. The 1998 legislation recognized the wisdom of targeting salmon recovery dollars where they could do the most good. To that end, the Legislature directed the Washington Conservation Commission, in consultation with Tribes and others, to invite the region's experts to identify habitat factors limiting salmon production in major watersheds across the state. (See 1998 Wash. Laws ch. 246, § 10, attached as Exhibit G.) Over a period of several years, the Conservation Commission published Salmon Habitat Limiting Factors Reports for all basins in Washington that produce salmon and steelhead. Fish passage was only one of many habitat factors examined. Others included floodplain conditions, riparian conditions, sediment conditions, woody debris conditions, pool habitat conditions, water temperature conditions, high flow conditions, low flow

conditions, and estuarine and nearshore habitat. The relative importance of those factors was different for each watershed. For some basins, such as the Lake Washington watershed, fish passage barrier culverts were found to be significant. For others, such as the Nisqually watershed, culverts were not identified as a significant limiting factor. The Conservation Commission's final summary report is attached as Exhibit H.

46. Another 1998 enactment authorized WSDOT to administer a fish passage grant program to assist state, local, tribal, and private groups to identify and remove fish passage barriers. (See 1998 Wash. Laws ch. 249, § 16, attached as Exhibit I.) In 1999, the Legislature created the Salmon Recovery Funding Board (SRF Board) to oversee a coordinated process for allocating grant monies for salmon recovery projects statewide, with administrative support from the Interagency Committee for Outdoor Recreation (now the Recreation and Conservation Office). (See 1999 Wash. Laws 1st sp. Sess. ch. 13, attached as Exhibit J.) It ultimately took over the grant program for fish passage barriers. A review team reviews and ranks project proposals that come before the SRF Board. That team incorporated the WDFW Fish Passage Priority Index methodology into its ranking process for fish passage projects, and still uses it today.

V. WDFW Fish Passage Research and Adaptive Management

47. One of the reasons I stayed at WDFW for 25 years was the passion and dedication of my colleagues. Throughout my career, my staff and others

conducted scientific and engineering research to make things better for fish, including our fish passage program. It was always a team approach. Mike Barber, Brian Benson, Tom Burns, Larry Cowan, Susan Cierebiej, Eva Wilder, Greg Johnson, Jim Lenzi, Pat Schille, Eric Egbers, Pat Powers, Ken Bates, and Bob Barnard all contributed to the development of our fish passage and screening procedures. It was a trial-and-error effort that started with good, technically sound ideas, followed by implementation of the ideas, recognition of needed improvements, group discussions to devise improved methods, implementation of the improvements, and repeating this cycle over and over. Using research to improve the way we do things is sometimes called "adaptive management," and this was adaptive management at its best. It could not have been accomplished without the fine-tuned team approach we had.

48. As described above, Washington State law provides that anyone who undertakes a construction project in state waters must obtain a hydraulic project approval from WDFW. WDFW and its predecessors have adopted rules to implement that law. An example of our adaptive management approach is the rule-making we did in the early 1990s. The current hydraulic rules were adopted in 1994 after a two-year revision process in which the Tribes were invited to participate. (The pre- and post-1994 culvert rules are attached as Exhibit K.) The 1994 rules reflected state-of-the-art research when they were adopted. For the first time, they identified specific options for culvert installation, and formalized specific fish passage criteria for culverts, including culvert size and maximum water veloci-

ty. Ken Bates, then a WDFW engineer, developed the water velocity criteria based on research conducted during the 1980s on the swimming abilities of adult fish. As of 1994, little information was available about the swimming abilities of juvenile salmon, so we used a six-inch trout as the closest surrogate.

49. Since 1994, several state and federal agencies, including WDFW, have participated in studies of juvenile salmon swimming abilities at WDFW's Skookumchuck Hatchery near Tenino, Washington. In 1997, Pat Powers of WDFW conducted a study involving juvenile coho salmon, which showed better passage in smooth pipes. In 2005-06, Battelle conducted a study on juvenile coho salmon passage through culverts retrofitted with baffles (excerpts attached as Exhibit L). The results suggest that baffles may make it easier for juvenile fish to swim upstream, but that juvenile fish behavior is complex. Both studies were funded by WSDOT.

50. Perhaps the most innovative research of the past decade has focused on the stream simulation approach to culvert design. Stream simulation is conceptually different from prior methods. Please refer to the Declaration of Robert Barnard, P.E., for a description of the stream simulation method and research about it.

I declare under the penalty of perjury that the foregoing is true and correct.

Executed on this *19th* day of March, 2009, at Olympia, Washington.

s/Paul Sekulich,
PAUL SEKULICH, PH.D.

EXHIBITS TO THE DECLARATION OF PAUL SEKULICH, PH.D.

Exhibit A
Curriculum Vitae of Paul Sekulich, Ph.D.

Exhibit B
Memorandum of Understanding Between the Washington State Departments of Fisheries, Wildlife, and Transportation Concerning Compliance With the Hydraulic Code (1990) (Bates Nos. T1000033 – T100054)

Exhibit C
1991 Wash. Laws, 1st sp. Sess., ch. 15, § 22 (Bates Nos. F0008267 – F0008268)

Exhibit D
Interagency Agreement between the Washington Department of Fisheries and the Washington State Department of Transportation to Perform a Fish Passage Inventory Statewide & Work With DOT in Planning Projects and Developing Agreements to Remove Fish Barriers Within DOT Rights-of-Way (December 6, 1991) (Bates Nos. T1000056 – T1000058)

Exhibit E
Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual (Washington Department of Fish and Wildlife, August 2000) (Bates Nos. USFWS 000875 – USFWS 001032)

Exhibit F
Excerpts from *Fish Passage Program Progress Performance Report for the Biennium 1991-1993* (Washington Department of Fisheries/Washington Department of Transportation, December 1992) (Bates Nos. T1000001, T1000002, T1000005, T100007 – T1000013, T1000015, T1000016, T1000060, T1000061)

Exhibit G
1998 Wash. Laws ch. 246

Exhibit H
Carol J. Smith, Ph.D., *Salmon Habitat Limiting Factors in Washington State* (Washington State Conservation Commission, 2005) (Exhibit AT 769 in Plaintiff Tribes' Exhibits, Corrected and Amended List, August 8, 2007)

Exhibit I
1998 Wash. Laws ch. 249

Exhibit J
1999 Wash. Laws 1st sp. Sess. ch. 13

Exhibit K
Washington Administrative Code § 220-110-110 Culvert Installation (1990 edition), and Washington Administrative Code § 220-110-070 Water Crossing Structures (1995 edition)

Exhibit L
Excerpts from Pearson, et al., *Final Report: Research on the Upstream Passage of Juvenile Salmon through Culverts: Retrofit Baffles* (Battelle Memorial Institute, April 2006) (Bates Nos. 113709 – 113714)

The Honorable Ricardo S. Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiff, v. STATE OF WASHINGTON, Defendant.	NO. C70-9213 Subproceeding No. 01-1 (Culverts) DECLARATION OF MICHAEL R. BARBER IN LIEU OF DIRECT TESTIMONY

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I, MICHAEL R. BARBER, declare as follows:

1. I am a Section Manager within the Habitat Program of the Washington Department of Fish and Wildlife (WDFW). I have held that position since December 2001. Among other things, I oversee WDFW's program to find and fix fish passage barriers on WDFW-owned lands. Under a contract with the Washington State Department of Transportation (WSDOT), I manage the WDFW work supporting WSDOT's fish passage program, supervise the preparation of the annual progress reports that describe the program, and update WSDOT's Ten-Year Plan of prioritized fish passage projects. I am also involved in budgeting and in developing fish passage assessment methods and training materials. My resumé is attached as Exhibit A.

2. I hold Bachelor and Master of Science degrees in Biology, both from Eastern Washington University. I earned my Master's degree in 1988. My

thesis examined the relationship between stream flow and fish habitat on Chamokane Creek in the Spokane Indian Reservation.

3. In 1985, I began working as a Fish Biologist with the Upper Columbia United Tribes Fisheries Center in Cheney, Washington. The Upper Columbia United Tribes is an intertribal organization of the Spokane, Kalispel, Coeur d'Alene, and Kootenai Tribes, and now the Colville Tribes as well. To assist the Northwest Power Planning Council in its policy development for the Upper Columbia River region, I directed a study to assess fishery improvement opportunities on the Pend Oreille River. For my master's thesis, I collected and analyzed habitat data for a study on the Spokane Indian Reservation. The results of both studies were published in technical reports and have been cited in others.

4. In September 1990, I joined the Washington Department of Fisheries[1] Habitat Program as a Fish Biologist. For about five years, I was involved in permitting decisions for construction projects and timber harvests. In 1995, I started working for Dr. Paul Sekulich on fish passage barrier projects. As described in the Declaration of Paul Sekulich, Ph.D., WDFW fixed culverts for several Western Washington counties during the mid-1990s. I was in charge of some of those projects, as well as some fish passage projects for WSDOT. I acted as

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[1] The Washington Department of Fisheries was a predecessor to the Washington Department of Fish and Wildlife.

Project Manager on about 18 fish passage construction projects from start to finish.

5. As described in Dr. Sekulich's declaration, WDFW has been conducting fish passage barrier inventories and habitat assessments for WSDOT since 1991. In 1999, I became the supervisor of the inventory crews, a responsibility that I still have, while continuing to serve as a Project Manager for fish passage construction projects. I was responsible for preparing the 1998 and 2000 versions of WDFW's *Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual.* (The 2000 version is attached as Exhibit E to the Declaration of Paul Sekulich, Ph.D.) I also served as a technical expert in the evaluation of fish passage grant applications for several grant programs described in the Declarations of Paul Sekulich, Ph.D., and Jeffrey P. Koenings, Ph.D.

I. Finding, Prioritizing, and Fixing Washington State Highway Culverts that Block Fish Passage

6. As described in the Declaration of Paul Sekulich, Ph.D., WDFW plans its fish passage work in a sequence: (1) find and evaluate the culverts that block fish passage; (2) record the information in a database; (3) prioritize the culverts for correction so as to get the most "bang for the buck;" (4) "scope" each correction project, that is, evaluate the site and possible fish passage solutions; (5) design a suitable structure that will achieve fish passage; (6) install it; and (7) after construction, monitor it to see

whether it worked. WDFW has been performing fish passage work for WSDOT since 1991 under a series of contracts. The 2007-09 contract is attached as Exhibit B.

A. Inventory: Finding and Evaluating WSDOT Culverts that Block Fish Passage

7. The Declaration of Paul Sekulich, Ph.D., describes how WDFW developed methods to find culverts that block fish passage and assess how much habitat they block. As Dr. Sekulich describes, WDFW began an inventory of culverts in the Washington State highway system in 1991. I have been supervising the inventory crews since 1999. At first, we had only one two-person crew, but we added a second in 2003. In 2007, they finished the fish passage barrier assessment part of the WSDOT culvert inventory, on more than 7,000 miles of highways statewide. It took 16 years to complete. It took that long in part because culvert assessment is hard work, as described in Dr. Sekulich's declaration, and in part because we got better at finding culverts when improved mapping and navigation technology became available, such as Global Positioning System devices. By the end of 2007, the inventory crews had found 3,185 WSDOT culverts in fish-bearing streams statewide. Of those, 1,859 were determined to be partial or complete fish passage barriers. The following table shows the results for the *United States v. Washington* Case Area:

Fish Passage Barrier Culverts Within WSDOT Rights-of-Way In the *United States v. Washington* Case Area				
Culverts that block > 200 meters of salmon and steelhead habitat	Culverts that block > 200 meters of nonanadromous fish habitat	Culverts that block ≤ 200 meters of fish habitat	Culverts that block an unknown amount of habitat	Total
807	122	279	7	1,215

8. If a culvert blocks fish passage, the next step is to determine how much habitat it blocks. If an initial assessment shows that the culvert blocks more than 200 meters of habitat, it gets put on the list for a more extensive habitat assessment under one of the methods described in WDFW's *Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual* (2000 version attached as Exhibit E to the Declaration of Paul Sekulich, Ph.D.). WDFW has scheduled its habitat assessment work by starting with the streams thought to have the most blocked habitat, so that the culverts suspected to be the highest priority to fix could be scheduled for correction as soon as possible. In July 2005, a two-person crew was formed to conduct habitat assessments full-time. After the two crews that were doing the culvert inventories described in Paragraph 7 finished their work, they were reassigned to habitat assessments. At this time, WDFW has three two-person crews conducting habitat assessments for the

WSDOT culverts that have been identified as fish passage barriers. They visit each culvert, walk the stream, and take measurements in accordance with WDFW protocols. We use the information they gather to generate prioritized lists of culverts to be fixed. As described in Dr. Sekulich's declaration, doing habitat assessments is strenuous and sometimes dangerous. Each crew walking the streams can complete about one mile per day. The young people who do this work are frequently away from home for days at a time. With three crews, we expect to complete all habitat assessments for the entire state highway system by mid-2015.

B. The Fish Passage and Diversion Screening Inventory Database

9. WDFW records the culvert inventory information it collects in a computer database now called the Fish Passage and Diversion Screening Inventory (FPDSI) database. Brian Benson of WDFW designed it in 1998 and has been maintaining and continuously updating it ever since. He set it up with internal links so that information can be easily retrieved and analyzed. It now contains over 36,000 entries, including nearly 20,000 for human-made structures in fish-bearing or potentially fish-bearing streams. Of those, approximately 58% are partial or complete fish passage barriers. The FPDSI contains data collected by WDFW and by recipients of culvert inventory grants. The FPDSI is not a comprehensive or complete inventory of fish passage barriers within the State of Washington, however. The Washington Department of Natural Resources and the United States Forest Service maintain their own separate databases with information from inventories they

have conducted, for example. WDFW does have some information about other inventories that local governments, Indian Tribes, and environmental groups have conducted, but only if that information has been voluntarily provided to WDFW.

10. **Data on Washington State Parks Culverts.** WDFW conducted a separate inventory of culverts at some Washington State Parks facilities in 2007 under a contract with the Washington State Parks and Recreation Commission. The following table shows the results of that inventory, as currently reflected in the FPDSI.

Fish Passage Barrier Culverts Within Washington State Parks Facilities in the *United States v. Washington* Case Area				
Culverts that block > 200 meters of salmon and steelhead habitat	Culverts that block > 200 meters of nonanadromous fish habitat	Culverts that block ≤ 200 meters of fish habitat	Culverts that block an unknown amount of habitat	Total
28	25	23	13	89

11. As of March 2009, the FPDSI contains 1375 records of WSDOT, WDFW, and State Parks fish passage barrier culverts within the *United States v. Washington* Case Area. For 393 of those culverts, WDFW has conducted habitat assessments to identify all additional human-made barriers between the known salmon access point and the first upstream

natural fish barrier. Within that group of 393, the FPDSI shows 42 anadromous fish passage barrier culverts in the Case Area that block more than 200 meters of habitat in streams with no other known anadromous barriers. A list is attached as Exhibit C.

C. Prioritization and Scoping: Evaluating a Culvert Site and Choosing a Fish Passage Correction Option

12. Once a habitat assessment for a culvert has been completed and the data recorded, a Priority Index number (PI) can be calculated for the culvert. Please refer to the Declaration of Paul Sekulich, Ph.D., for a description of the Fish Passage Priority Index and how PIs are calculated. WDFW has calculated PIs for about 462 WSDOT barrier culverts statewide, including 341 within the *United States v. Washington* Case Area. Their PI numbers range from 1 to 62. In general, the higher a culvert's PI number, the higher the priority to fix the culvert. We did not wait to finish all the PI calculations before we started fixing WSDOT culverts, however. We have prioritized culverts for correction with whatever list we had at the time, focusing on those with higher PIs, especially if there were no other fish passage barriers in the watershed. As of early 2009, most WSDOT barriers with a PI greater than 20 and no other barriers in the watershed have been fixed.

13. PI numbers are a valuable tool that decision-makers can use to compare culverts, but they do not in themselves dictate the order in which culverts are fixed. Assigning a PI number is just an initial step in planning what to do about a fish passage barrier culvert. WDFW and WSDOT use a scoping

process to make decisions about fish passage projects. (See Exhibit B, Bates Nos. F0007042 – F0007043.)

14. Biologists get the scoping process started. First, they verify the information already collected about the culvert. A WDFW biologist visits the culvert and checks to see whether the information collected in the inventory and habitat assessment is correct and still current, filling in any data gaps. Next, the biologist confirms that habitat conditions and fish species expected to benefit are correctly reflected in the PI for the culvert. If not, the PI may be recalculated. Then, the biologist collects other information about the culvert, such as whether there are other human-made barriers in the watershed, and whether other habitat restoration efforts are occurring in the watershed. The biologist also considers the feasibility, likelihood of success, and potential cost of a project. The biologist summarizes this information and generates a map to show the location of additional human-made barriers located downstream and upstream of the barrier. An example, relating to two culverts on Anderson Creek under State Route (SR) 16 near Port Orchard, is attached as Exhibit D.

15. The biologist may either recommend that a project be put on "Hold" until other habitat problems in the watershed are corrected, or that a project go forward. For the Anderson Creek culverts described in Exhibit D, the biologist recommended that the project go forward because of high-quality habitat upstream, even though there are other fish passage barriers in the watershed. The next step in the scoping process is the assignment of a WDFW scoping engineer to develop conceptual designs for

barrier correction. To do that work, WDFW has eight environmental engineers statewide and two engineering aides who assist them. The engineer visits the site, takes measurements and photos, evaluates options, and prepares a written report with recommendations for fish passage solutions, which may include a rough cost estimate. An example, relating to the Anderson Creek culverts described in Exhibit D, is attached as Exhibit E. With current staffing, WDFW is able to prepare about 80 scoping reports per biennium for WSDOT.

16. Once the conceptual design options have been identified, WSDOT staff get involved, along with the WDFW Area Habitat Biologist assigned to the region where the culvert site is located. They meet with the WDFW scoping biologist and engineer in a "pre-scoping meeting." Together, the group selects a preferred design option. For example, Exhibit D shows that the preferred design option selected for the Anderson Creek culverts is replacement with a single stream simulation culvert estimated to cost $6.4 million.[2] Once a preferred design option has been selected, the project is eligible to be placed on the WSDOT Ten-Year Plan for fish passage barrier correction, which I prepare in coordination with the WSDOT Environmental Services Office. The Anderson Creek site described in Exhibits D and E, which has a PI of 38.6, has been placed on the Ten-Year Plan. WSDOT has requested $479,000 for engineering and design work during the 2009-11

[2] Please refer to the Declaration of Robert Barnard, P.E., for a discussion of the stream simulation culvert design method.

biennium, with construction possible during the 2011-13 biennium.

D. Design and Construction

17. During the 1990s, WDFW designed and constructed about 30 fish passage projects for WSDOT. I was the Project Manager on some of those projects. Today, WSDOT uses its own engineers to do the design and hires private contractors to do the construction. WDFW provides input at the "60% design" level, where major design elements are well established. WDFW reviews the design to make sure it is consistent with the preferred design option developed and agreed to during the scoping process. WDFW also has a role at the permitting stage, when it receives WSDOT's application for a hydraulic project approval (HPA) under RCW 77.55.021. WDFW may impose additional conditions for the protection of fish life, such as restrictions on the timing of construction.

E. Monitoring to See Whether the Fish Passage Project Worked

18. Immediately after WSDOT finishes a fish passage construction project, WDFW inspects it to verify that it was built as permitted and designed. WDFW also does that for fish passage projects on its own lands (described below). Among other things, WDFW determines whether the newly-built structure is passable to fish. For WSDOT culvert projects constructed with dedicated funds, under the "I-4 program,"[3] WDFW checks the culvert again after it

[3] Please refer to the Declaration of Paul J. Wagner for a description of the WSDOT I-4 program.

has been in place for one winter storm season to verify that it remains passable to fish.

19. For WSDOT culvert projects constructed under the "I-4 program," WDFW conducts fish spawner surveys in the stream before construction and one year after construction. The purpose is to verify that adult salmon are getting through the new structure and spawning upstream of it. WDFW does not check to see whether fish production actually increases after the culvert is fixed. The number of additional fish that might be produced from fixing a single culvert would not be detectable given the natural variability in run sizes due to ocean survival and other factors.

20. WDFW has four test sites where it conducts ongoing monitoring through annual spawner surveys. We want to know how different fish passage design methods compare with each other, so the four test sites represent four different design methods:

- Unnamed tributary to South Branch Big Creek (US 101, mile post 101.1 near Humptulips), to represent a hydraulic design option;
- Moose Creek, tributary to the North Fork Stillaguamish River (SR 530, mile post 44.0 west of Darrington), to represent a no slope design option;
- Fairchild Creek, tributary to Big Creek (US 101, mile post 105.6 near Humptulips), to represent a fishway retrofit design option; and
- Dogfish Creek, tributary to Liberty Bay (SR 307, mile post 0.07 near Poulsbo), to represent a stream simulation design option.

Please refer to the Declaration of Robert Barnard, P.E., for a description of these culvert design methods. The results of the annual surveys indicate that none of the projects are blocking fish passage, because we are not seeing a disproportionate number of adult fish or redds (salmon nests) downstream of the project sites.

II. Culverts on WDFW-Owned Lands

21. The Washington Department of Fish and Wildlife manages lands and roads of its own, which have culverts and, sometimes, fish passage problems. WDFW-owned lands include Wildlife Areas managed for wildlife habitat and public recreation, water access sites where people can launch boats to go fishing, and fish hatcheries. WDFW owns about 550,000 acres of land statewide, mostly in rural settings. That figure changes over time, as WDFW sometimes acquires or transfers lands.

22. In 1997, WDFW began an inventory of all fish passage and fish screening structures on its lands, including roads and culverts. I have been overseeing those inventories since 2001. They are complete within the *United States v. Washington* Case Area, but WDFW is still working on inventories and habitat assessments on its lands in the remainder of the state. WDFW has generally used the same inventory and prioritization methods on its own lands as it has on state highways, as described in WDFW's *Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual* (attached as Exhibit E to the Declaration of Paul Sekulich, Ph.D.). The principal difference is that WDFW has performed "stream-based" inventories on

its own lands, in contrast to the "road-based" inventories it has conducted for WSDOT. In a "stream-based" inventory, biologists or technicians walk the entire stream looking for fish passage barriers, whether they are associated with a road or not. My staff have found 73 culverts that currently block fish passage on WDFW lands within the *United States v. Washington* Case Area, as follows:

Fish Passage Barrier Culverts on WDFW Lands Within the *United States v. Washington* Case Area			
Culverts that block > 200 meters of salmon and steelhead habitat	Culverts that block > 200 meters of nonanadromous fish habitat	Culverts that block ≤ 200 meters of fish habitat	Total
51	3	19	73

23. As fish passage barriers are identified, WDFW begins developing plans to correct them through a scoping process like the one described above for WSDOT culverts. WDFW first collects information on the biology and physical characteristics of the site. WDFW engineers then develop correction options with cost estimates. As data for particular sites become available, recommended solutions are chosen and projects are moved forward for implementation through the state capital budget process.

24. WDFW's goal is to fix all fish passage barriers on its lands by July 1, 2016, provided funding is available. The WDFW Habitat Program Ten-Year Capital Plan as of December 2008, which includes

WDFW's proposed schedule for fish passage barrier correction on its lands, is attached as Exhibit F. As of January 2009, the average cost per correction is estimated at $230,000, in 2008 dollars.

25. WDFW is making progress in fixing its fish passage barriers, including those within the *United States v. Washington* Case Area. In 2008, WDFW fixed six culverts on the Stillwater Wildlife Area, near Carnation. Two were replaced with foot bridges, two were replaced with new culverts, and two were simply removed. WDFW also replaced one culvert on the Johns River Wildlife Area near Grays Harbor. During the 2009-2011 biennium, WDFW plans to remove or replace fish passage barrier culverts at 21 sites within the *United States v. Washington* Case Area—20 on the Cherry Valley Wildlife Area near Duvall, and one on the Johns River Wildlife Area near Grays Harbor. This work is expected to cost more than four million dollars. WDFW currently plans to correct an additional 27 barrier culverts in the Case Area, 15 of which block more than 200 meters of habitat, during the 2011-2013 biennium.

26. Culverts are not the only capital funding needs that WDFW has. Maintenance and infrastructure upgrades have been long delayed at many WDFW facilities. For example, improvements at WDFW hatcheries are needed to implement the recommendations of the Hatchery Scientific Review Group described in the Declaration of Jeffrey P. Koenings, Ph.D. A January 2009 capital budget presentation that WDFW's Capital Planning and Facilities Management group prepared for the Washington Fish and Wildlife Commission is

attached as Exhibit G. The total WDFW 2009-11 capital budget proposed by Governor Gregoire was $87 million, and that does not cover all needs.

III. Bringing WDFW Technical Expertise to the Public

27. In the late 1990s, WDFW began developing educational materials and conducting training to help others, such as federal, tribal, and local governments, conservation groups, and landowners, to find, prioritize, and correct non-state-owned fish passage barriers. As described in the Declaration of Paul Sekulich, Ph.D., WDFW developed a standard fish passage barrier assessment protocol and published it in 1998 in a manual entitled *Fish Passage Barrier Assessment and Prioritization Manual.* I was involved in that project. WDFW began providing training and follow-up technical assistance to Salmon Recovery Funding Board grant recipients and others so that they could conduct culvert inventories. As described above in Paragraph 9, WDFW developed a fish passage database to act as a centralized repository for the data collected by grant recipients.

28. WDFW revised the 1998 culvert barrier assessment manual in 2000, adding new sections on fishways, dams, and surface water diversion screens. The 2000 version is attached to the Declaration of Paul Sekulich, Ph.D., as Exhibit E. I was involved in preparing the 1998 and 2000 versions, and I have been supervising the preparation of a new revision that we expect to release in 2009. The 2009 version provides additional guidance and updated

methodology. The contents of each version of the manual are summarized in the table below.

Level A culvert evaluation[4]	√	√	√ updated
Level B culvert evaluation	√	√	√
Physical Survey (PS) habitat assessment method[5]	√	√ updated	√
Threshold Determination (TD) habitat assessment method	√	√	√
Expanded Threshold Determination (ETD) habitat assessment method	√	√	No
Reduced Sampling Full Survey (RSFS) habitat assessment method	No	√	√
Priority Index (PI)	√	√	√
Fish Passage and Diversion Screening Inventory (FPDSI) Database users manual[6]	√	√	No
WA state precipitation map (for Level B analysis)	No	√	√
% passability table for barrier culverts	No	No	√
Non-culvert road crossings	No	No	√
Dams	No	√	√ Expanded

Fishway	No	√	√ Expanded
Miscellaneous obstructions	No	No	√
Natural Barriers	No	√	√ Expanded
Surface water diversions (gravity & pump diversions)	No	√	√
Screening Priority Index (SPI)	No	√	√
Inventory process (guidance on how to develop an inventory)	No	√	√ Expanded
Quattro Pro habitat data entry spreadsheets presented	√	√	No
Excel habitat data entry spreadsheets presented[7]	No	√	√ updated
Expected species use[8]	√	√ updated	√
Fish bearing stream criteria[9]	√	√ updated	√ updated
Glossary of terms	No	No	√
List of recommended equipment for inventory	No	No	√

Instructions for measuring channel width (Appendix H from the *Design of Road Culverts for Fish Passage*, WDFW 2003)[10]	No	No	√
Basic Culvert Surveying Techniques	No	No	√
Pump Flow Chart (surface water diversions)	No	No	√

[4] See Paragraph 16 of the Declaration of Paul Sekulich, Ph.D., for a discussion of the Level A analysis in the 2000 version of the manual. The 2009 revision updates the Level A flow chart by moving the water surface drop to the top of the chart and allowing the option of conducting a Level B analysis when culverts are not backwatered and the culvert slope is less than 1 percent.

[5] The 2000 revision added a discussion of pond and lake rearing habitat and included a "lake adjustment factor" to correct for over-estimation of rearing habitat in ponds and lakes. See page 38 in Exhibit E to the Declaration of Paul Sekulich, Ph.D. (Bates No. USFWS 000917).

[6] WDFW plans to develop a separate database users manual.

[7] See Appendix G of Exhibit E to the Declaration of Paul Sekulich, Ph.D. (Bates No. USFWS 001018). The 2009 revision updates the data entry spreadsheet to reflect terminology used in the 2009 manual (i.e. "OHW" changed to "SLW"; "downstream check" now called "fish access check"; "Barrier Site ID" changed to "Additional Feature Site ID"). Stream flow measurements are omitted in the 2009 version. Brook trout and brown trout are removed from the "Species Presence" section. WDFW has decided not to include them because they are exotic, non-native species.

29. WDFW has also developed a manual to provide guidance in the design of road culverts for fish passage. It was first published in 1999 and updated in 2003. The 2003 manual *Design of Road Culverts for Fish Passage* is attached as Exhibit B to the Declaration of Robert Barnard, P.E. WDFW expects to publish a new *Water Crossings Design Manual* in late 2010, which would replace the 2003 manual. WDFW has been providing technical assistance and training on the application of its culvert design manual since 1999.

30. Both of the WDFW fish passage technical assistance manuals, along with other technical guidance materials for fish passage and fish screens, are available to the public on the WDFW internet web site, http://wdfw.wa.gov/hab/engineer/habeng.htm.

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[8] Expected fish species use within different stream gradient strata table was updated in 2000 to reflect expected species passability (transport) through different gradient strata. The 2000 revision also added data for searun cutthroat trout and bull trout/Dolly Varden.

[9] Fish bearing stream criteria were updated in the 2000 and 2009 revisions, mainly to reflect changes in the Washington Forest Practices Board stream typing rules in Chapter 222-16 of the Washington Administrative Code.

[10] See pages 100-102 in Exhibit B to the Declaration of Robert Barnard, P.E. (Bates Nos. USFHWA/SUPP 002440 – USFHWA/SUPP 002442).

I declare under the penalty of perjury that the foregoing is true and correct.

Executed on this *27th* day of March, 2009, at Olympia, Washington.

s/Michael R. Barber
MICHAEL R. BARBER

EXHIBITS TO THE DECLARATION OF MICHAEL R. BARBER

Exhibit A
Resumé of Michael R. Barber

Exhibit B
Interagency Agreement No. GCA5236 between the Washington State Department of Transportation and the Washington Department of Fish and Wildlife (June 2007) (Bates Nos. F00070366 – F0007044), and Supplement No. 1 (November 2007) (Bates Nos. F0007056 – F0007057)

Exhibit C
Table "WSDOT and WDFW barrier culverts unaffected by additional upstream or downstream barriers" (extracted by Brian Benson from the Fish Passage and Diversion Screening Inventory database on March 25, 2009)

Exhibit D
WSDOT Fish Passage Barrier Scoping Summary Report for SR 16, Milepost 28.10 (December 17, 2007), prepared by WDFW Scoping Biologist Susan Cierebiej

Exhibit E
WSDOT Culvert Scoping Report for SR 16, Milepost 28.10 (March 20, 2007), prepared by WDFW Engineer Bob Barnard (Bates No. CD F0008102, folder SR 16 MP 28.1)

Exhibit F
WDFW Habitat Program Ten-Year Capital Plan, December 2008 (Bates Nos. F0006886 – F0006888)

Exhibit G
WDFW 2009-2011 Ten-Year Capital Plan, Agency Request vs. Governor Proposed as of December 19, 2008—Commission Presentation January 9, 2009 (Bates Nos. F0009769 – F0009794)

The Honorable Ricardo S. Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, Defendant.	NO. C70-9213 Subproceeding 01-1 (Culverts) ADDENDUM TO THE DECLARATION OF MICHAEL R. BARBER IN LIEU OF DIRECT TESTIMONY

I, MICHAEL R. BARBER, declare as follows:

31. On March 27, 2009, I executed a Declaration of Michael R. Barber in Lieu of Direct Testimony in *United States v. Washington* Subproceeding 01-1. In Paragraph 6, I summarized the fish passage work that the Washington Department of Fish and Wildlife (WDFW) has done for the Washington State Department of Transportation (WSDOT) under a series of contracts. In Paragraphs 21 through 26, I described the work that WDFW has done to identify fish passage barrier culverts on WDFW-owned lands, and WDFW's plans to fix them. I submit this Addendum to update that information. The paragraphs in this Addendum are numbered sequentially to follow those in my March 27,2009 Declaration.

32. In Paragraph 6 of my March 27, 2009 Declaration, I stated that WDFW has been performing fish passage work for WSDOT since 1991 under a series of contracts, and I attached a copy of the contract for the 2007-2009 biennium. In June 2009, WDFW and WSDOT executed a new contract for the 2009-2011 biennium. It took effect on July 1, 2009. A copy of the 2009-201 1 contract is attached as Exhibit H.

33. In Paragraph 8 of my March 27, 2009 Declaration, I stated that WDFW expected to complete habitat assessments for fish passage barrier culverts in the entire state highway system by mid-2015. At this time, I estimate that, with three crews, WDFW will be able to complete habitat assessments for WSDOT fish passage barriers in the *United States v. Washington* Case Area by January 2013. At this time, it is difficult to make a reliable estimate of the completion date for habitat assessments in Eastern Washington. Our very rough estimate is that WDFW will be able to complete all habitat assessments for the entire state highway system by August 2017.

34. In Paragraph 22 of my March 27,2009 Declaration, I stated that my staff had found 73 culverts that block fish passage on WDFW lands within the *United States v. Washington* Case Area. My staff has now determined that two of those 73 culverts are not in fish-bearing streams. The following table shows the current status of culverts that block fish passage on WDFW lands within the Case Area.

Fish Passage Barrier Culverts on WDFW Lands Within the *United States v. Washington* Case Area			
Culverts that block > 200 meters of salmon and steelhead habitat	Culverts that block > 200 meters of nonanadromous fish habitat	Culverts that block ≤ 200 meters of fish habitat	Total
51	3	17	71

35. When I prepared my March 27, 2009 Declaration, the 2009 Washington legislative session was still underway, and the Washington Legislature had not yet enacted a capital budget for the 2009-2011 biennium. The Legislature has now done that. The Legislature appropriated less for culvert repair on WDFW-owned lands than WDFW requested. Attached as Exhibit I is a char comparing the capital funds that WDFW requested, the capital budget that Governor Gregoire proposed, and the 2009-2011 capital budget that the Legislature enacted for WDFW.

36. In Paragraph 24 of my March 27, 2009 Declaration, I referred to the WDFW Habitat Program Ten-Year Capital Plan as of December 2008, which I attached as Exhibit F. I have now revised the ten-year plan to reflect WDFW's capital budget for 2009-2011. The culvert projects that WDFW had planed to conduct on its lands during the 2009-2011 biennium have been postponed to later biennia. The WDFW Habitat Program Ten-Year Capital Plan as of July 2009 is attached as Exhibit J.

I declare under the penalty of perjury that the foregoing is true and correct.

Executed on this *6th* day of July, 2009, at Olympia, Washington.

s/Michael R. Barber
MICHAEL R. BARBER

EXHIBITS TO THE ADDENDEUM TO THE DECLARATION OF MICHAEL R. BARBER

Exhibit H
Interagency Agreement No. GCA6019 between the Washington State Department of Transportation and the Washington Department of Fish and Wildlife (June 2009) (Bates Nos. F0014545 - F0014555)

Exhibit I
WDFW 2009-2011 Capital Budget (Bates No. F0014982)

Exhibit J
WDFW Habitat Program Ten-Year Capital Plan, April 2009 (Bates No. F0014558)

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Exhibit C. WSDOT and WDFW barrier culverts
barriers. These culverts represent barriers to
of potential habitat gain within

Site ID	Road	Stream	Tributary To	WRIA
990148	US 101	Fisher Cr	Queets R	21.0018
990400	US 101	Steamboat Cr	Pacific Ocean	20.0574
990178	US 101	Harlow Cr	Queets R	21.0134
982712		Hurd Cr	Dungeness R	18.0028
990606	SR 542	Chain-up Cr	NF Nooksack R	1
993679	US 101	unnamed	Hoquaim R	22
990187	SR 542	Hedrick Cr	Nooksack R	1.0463
990450	SR 106	Twanoh Falls Cr	Hood Canal	14.0134
994799	US 12	unnamed	Chehalis R	22.0542
990385	SR 108	Skookum Cr	Skookum Inlet	14.002
990151	SR 530	Fortson Cr	NF Stillaguamish R	5.0254
990731	US 101	unnamed	Stevens Cr	22.0064A
991066	SR 8	unnamed pond	Wildcat Cr	22
991606	US 101	Schaerer Cr	Hood Canal	16.0326
990395	SR 3	Spring Cr	Hood Canal	15.0364
991244	SR 106	unnamed	Skokomish R	16.0002
990246	SR 530	Little French Cr	Fortson Cr	5.0253
997787	SR 109	unnamed	Pacific Ocean	21.0727
992344	SR 9	unnamed	Black Slough	1
991559	SR 302	unnamed	North Bay	15.0001
991266	SR 109	unnamed	Pacific Ocean	21
991271	SR 109	unnamed	Pacific Ocean	21.0716
993702	US 101	unnamed	WF Hoquiam R	22
991716	SR 203	unnamed	Snoqualmie R	07.0219A
991690	US 101	unnamed	Stevens Cr	22

unaffected by additional upstream or downstream anadromous salmon that have >200 lineal meters WRIA's 1-23 as of March 25, 2009.

PI	Survey Date	Spawning Area (m^2)	Rearing Area (m^2)	Lineal Gain (m)	Owner
29	1/30/2007	9836	12568	5132	WSDOT
27.53	4/4/1996	25322	26208	7434	WSDOT
25.68	4/12/1995	16231	16925	5525	WSDOT
19.23	9/18/2008	103	1967	717	WDFW
17.41	11/18/2005	370	491	276	WSDOT
17.35	4/18/2002	0	4450	323	WSDOT
16.63	3/10/1992	159	576	551	WSDOT
16.37	11/17/2008	4104	3193	3059	WSDOT
16.04	11/26/2005	1494	3548	3293	WSDOT
15.9	6/18/2007	811	1537	490	WSDOT
15.37	3/21/2006	860	1391	1030	WSDOT
14.44	11/15/1996	485	3052	1162	WSDOT
14.17	5/22/2002	0	4339	418	WSDOT
13.4	12/2/2003	542	580	250	WSDOT
13.37	7/7/2000	1094	1578	1441	WSDOT
13.03	12/16/1993	405	678	437	WSDOT
12.47	12/20/1995	1137	821	996	WSDOT
12.26	10/25/2007	658	2389	1937	WSDOT
11.83	8/23/2005	0	1053	665	WSDOT
11.44	1/27/1994	232	576	483	WSDOT
11.36	5/17/1995	599	548	482	WSDOT
11.07	1/21/1993	1239	1482	816	WSDOT
11.02	12/7/2005	15	1098	1037	WSDOT
10.96	9/8/1995	320	725	421	WSDOT
10.83	10/13/2008	33	2848	972	WSDOT

991265	SR 109	unnamed	Pacific Ocean	21.0764
991731	SR 112	unnamed	Green Cr	19
990957	US 12	unnamed	Higgins Slough	22
991063	SR 8	unnamed	Cloquallum Cr	22
991261	US 101	unnamed	Pacific Ocean	20.0000A
990656	SR 510	unnamed	McAllister Cr	11.0328
990084	SR 7	Coal Cr	Roundtop Cr	11.0168
991647	US 101	unnamed	Hoh R	20
993698	US 101	Unnamed	WF Hoquiam R	22
991574	US 101	unnamed	Dowans Cr	20.0248A
991516	SR 16	unnamed	Burley Cr	15
991911	US 12	unnamed	Higgins Slough	22
991239	SR 302	unnamed	Case Inlet	15
995521	SR 116	unnamed	Port Townsend Bay	17
990921	SR 109	unnamed	Grays Harbor	22
991592	US 101	Hell Roaring Cr	Hoh R	20.0441
991910	US 12	unnamed	Higgins Slough	22

10.52	5/18/1995	0	1948	500	WSDOT
9.81	9/19/1995	287	305	418	WSDOT
9.67	5/28/2008	323	421	858	WSDOT
9.5	5/15/2002	0	656	234	WSDOT
9.19	6/9/1994	242	572	277	WSDOT
9.18	3/28/1997	0	1790	1449	WSDOT
8.86	7/7/1995	484	1394	1101	WSDOT
8.72	2/4/1997	158	578	853	WSDOT
8.62	10/15/2008	20	122	240	WSDOT
8.24	2/5/1997	268	1585	677	WSDOT
8.04	9/8/1994	186	308	817	WSDOT
7.82	6/2/1995	226	378	300	WSDOT
5.01	10/13/2004		63		WSDOT
4.71	12/11/2007	34	49	240	WSDOT
4.23	10/15/2008	0	190	366	WSDOT
3.01	5/15/2008	156	361	466	WSDOT
1.52	6/27/2002	26	133	200	WSDOT

The Honorable Ricardo S. Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, Defendant.	NO. C70-9213 Subproceeding No. 01-1 (Culverts) DECLARATION OF JEFF CARPENTER, P.E. IN LIEU OF DIRECT TESTIMONY

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I, Jeff Carpenter, P.E., declare as follows:

1. I am a citizen of the United States, over the age of 18 years, and I am competent to testify as a witness. The statements in this declaration are based on my personal knowledge and upon my review of official public records.

INTRODUCTION

2. I am the Project Control and Reporting Director for the Washington State Department of Transportation (WSDOT). In my current position, I am required to have knowledge of WSDOT's budget in terms of revenue and expenditures. I have held my current position since February 2008, and on several occasions I have been asked to make budget presentations to members of the Legislature and legislative staff. During those presentations, I explained WSDOT's revenue sources and its expenditures.

3. Serving as the Director, I monitor the funding and expenditures for all capital projects, approve all changes to scope, schedule, and budget of projects, and provide project progress reports to WSDOT executives and external customers. I regularly work with WSDOT's Systems Analysis and Program Development Office to provide feedback on proposed changes to projects. I also assist in the preparation and assessment of projects within the biennial budget request to the Legislature.

4. Prior to this position, I worked for 17 years in managerial positions at WSDOT varying from the assistant design project engineer for the Olympic Region to the Project Director responsible for

overseeing the design and construction of bridge projects with budgets of hundreds of millions of dollars. Through these positions I gained experience with WSDOT's revenue sources and budget limitations from the project level to the agency-wide programmatic level.

5. The exhibits attached to this declaration are true and correct copies of records kept in the ordinary course of official public business, or are accurate summaries of voluminous public data. As the Director, I am one of the custodians of public records within my section.

GENERAL FACTORS AFFECTING WSDOT CULVERT REMEDIATION

6. There are three broad factors that affect how quickly WSDOT is able to implement its plans to remediate culverts that block or impede fish passage. These factors are a) funding, b) the availability of qualified contractors/work forces, and c) the "fish window" for performing construction work in a particular stream. This declaration will focus on the WSDOT budget and the funding for culvert remediation.

7. The State of Washington has recognized the impact of the transportation infrastructure on the environment for many years. This includes the impact on fish caused by culverts that impair or block the passage of fish. Years before this lawsuit was filed, WSDOT had established a budget line item specifically targeting culvert remediation. This budget item has been included as a permanent line item within the environmental retrofit category referred to as the I-4 budget since 1991. WSDOT has

been and continues to be a leader in the nation among transportation agencies in dedicating efforts to remediate transportation impacts on fish.

8. The WSDOT budget currently is experiencing significant shortfalls in available funds, as are other government functions. The revenue dedicated to transportation needs that is generated from State sources (primarily the State gas tax and various licensing fees) for FY 2009-2011 is currently projected to be $965 million less than what is necessary to fund the anticipated obligations of WSDOT. The severe revenue shortfall will compel the Legislature and WSDOT to make significant cuts to a wide variety of programs. As discussed in more detail below, one source of funding for culvert remediation by WSDOT is through a portion of its environmental budget known as the I-4 budget. The Governor has proposed $17.9 million for culvert remediation in the FY 09-11 I-4 budget. This would constitute an increase for that budget at a time when many other programs are being reduced or eliminated.

WSDOT REVENUE AND DISTRIBUTION

9. The combined total of all WSDOT revenue sources, both state and federal, for FY 09-11 is $5.271 billion. WSDOT's expenditures (its "budget") are divided between the operating and capital budgets. Attached as Exhibit A, is a chart summarizing the organization of the WSDOT budget.

10. The overwhelming majority of the budget (more than 85%) is dedicated to specific obligations by law, and WSDOT has no discretion to vary the percentage of its budget that is so dedicated.

For example, the state Legislature frequently identifies specific projects to be built with gas tax revenue as it did with the 5 cents per gallon "Nickel" tax and the 9.5 cent per gallon Transportation Partnership Act (TPA) tax. WSDOT cannot spend the revenue from those taxes on any projects other than those that have been specified by the Legislature.

11. The revenue from the state's 37.5 cents per gallon gas tax is the primary source of transportation money raised by the state. The anticipated amount of revenue from the gas tax is down from previous years' receipts because less gasoline is being consumed. Even if the State were to receive more revenue from this source than is anticipated, the gas tax is insufficient to pay for all of the demands placed on the transportation system.

12. Funding from the federal government will account for 16% of WSDOT" s revenue in FY 09-11. 60% of the funding received from the federal government comes with specific restrictions on use of the funds and is unavailable for culvert remediation. Most federal funding for Washington State capital highway projects arises from the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). This is a federal trust fund. As its name implies, the Act seeks to address transportation safety issues on all projects and the scope of work and designs are prepared with safety in mind. These funds are unavailable for repairing culverts. The SAFETEA -LU trust fund will be exhausted in 2009. It is unclear how major safety projects will be funded in the future.

13. Another example of restricted federal funding came in early 2009 as part of the American Recovery and Reinvestment Act (ARRA). The federal government conditioned the release of ARRA funding to only projects which were "shovel ready." That term is generally defined as a project which has the design and environmental permitting complete, all right of way purchased and is able to be advertised for bid within 360 days of disbursement of the funds. Because of the "shovel ready" requirement, projects requiring extensive environmental permitting (such as culvert remediation) are unlikely to meet the federal stimulus requirements. Projects that include replacement of fish passage barriers have historically required at least two years to reach bid advertisement. This amount of time is needed because of the time required for property acquisition and environmental permitting. WSDOT does not have culvert projects that would qualify for ARRA funds.[1]

14. The amount of funding available to WSDOT for FY 09-11 that does not come with a specific mandate for how the money must be spent is approximately $600 million. Although these funds are not mandated for specific projects, WSDOT is required to spend the funds in accordance with legislative

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[1] In a situation where WSDOT has a highway construction project that will also remediate a culvert and the construction project qualifies for ARRA funds, then it would be possible that some ARRA funding would be used for culverts.

priorities for the broader mission of WSDOT. These priorities are defined for WSDOT through the budgeting process.

15. The funds that are not restricted to specific projects or activities must be used to fund the following broad categories of WSDOT responsibilities: maintaining the condition of the pavement for 20,250 lane miles of roadway; safety and preservation of 3,600 bridges and elevated structures on the state system; maintaining the facilities of the existing infrastructure; snow and ice removal; paying for the electrical system to light the roadways at night and to operate traffic control devices; environmental retrofit; congestion relief; and unanticipated emergencies.

16. WSDOT assists the Legislature by prioritizing projects according to the policies of improving safety, maintaining the current infrastructure, and making improvements to the system. Every biennium, WSDOT submits a list of projects and activities prioritized according *[sic]* the policies described above and to the category of highway needs with a recommended investment amount for each category. The Legislature ultimately determines the prioritization for any funds that are not mandated for specific projects and activities.

17. There have never been sufficient funds to pay for all of the activities and projects on the prioritization lists submitted to the Legislature by WSDOT. The activities and projects are performed in the order of the priority established by the Legislature. WSDOT will work as deeply down the priority lists as the available funding allows. With the legislative session still underway, it is unknown how

much will be funded and what changes to prioritization the Legislature will make.

18. The prioritization of the non-dedicated funds is a zero-sum budget exercise. That is, if funding is used for a particular purpose, that necessarily means that other needs will have less funding or may have to be eliminated. Currently many critical statewide transportation activities are significantly underfunded or have been postponed. For example, there are numerous major maintenance projects that are being deferred due to lack of available funds such as a growing list of steel bridge painting (currently 55 bridges - $170 million), aging pavements not being addressed (currently 550 lane miles - projected to be over 1,500 by the end of 2011), bridge deck rehabilitations (60 bridge decks - $70 million), and bridge deck replacements (35 bridges - $547 million).

19. More worrisome is the fact that important safety projects are being deferred due to lack of funding. For example, SR 101 near Shelton needs additional rumble strips and SR 195 near Cheney has a potentially dangerous at-grade intersection. SR 9, SR 291, and SR 302 also have pressing safety projects for which there is no available funding.

INCREASING CONSTRUCTION COSTS AND DECREASING REVENUE

20. Much of WSDOT's current revenue problems are the result of two trends-increasing construction costs and decreasing revenue. During the last five years inflation for transportation related construction increased by 60%. This rate of inflation results in a significant reduction in the purchasing

power of transportation funds. The increase in inflation was the result of a high demand for construction materials and oil-based products, such as asphalt and oil used for repaving projects. High oil prices also eventually led to a significant reduction in the number of miles driven by motorists with a corresponding reduction in the amount of gas tax collected. Since the gas tax is not indexed to inflation, WSDOT's gas tax revenues are in a constant state of decline compared to WSDOT's costs. During the past year, both the federal and state governments reduced their budget appropriations for transportation agencies in order to align with these reduced revenues.

THE MAINTENANCE ACCOUNTABILITY PROGRAM

21. In 1998, the Legislature established a Maintenance Accountability Program (MAP) for WSDOT. The MAP program establishes specific performance goals for WSDOT. The background and requirements of the MAP program can be reviewed at http://www.wsdot.wa.gov/maintenance/pdf/MAP_Manual2008.pdf. The Legislature uses the MAP program to determine whether additional funding is needed to meet the maintenance and operation objectives set by the Legislature.

22. Due primarily to declining revenue, WSDOT is unable to meet most targeted service levels in an acceptable fashion. Exhibit B is WSDOT's MAP report card from 2004 - 2008. There is currently an $85 million backlog of maintenance projects. The affects of deferred maintenance are captured by the

attached photograph of a bridge in Washington. Exhibit C.

IMPROVEMENT AND REMEDIATION PROJECTS

23. Improvement projects are aimed at correcting specific deficiencies within the transportation system or network such as high accident locations and particularly congested corridors. The budget designations for the four improvement programs are I-1 (Safety), I-2 (Mobility), I-3 (Economic Initiatives) and I-4 (environmental retrofit). As noted above, the I-4 budget is one of the sources for funding culvert remediation.

- **I-1 (Mobility).** Generally, mobility projects are projects which are designed to reduce congestion problems. At present, no gas tax revenue is available for new mobility projects. As a result, congestion relief projects such as corridor extensions for SR 509 and SR 167 are indefinitely postponed.
- **I-2 (Safety).** WSDOT is focused on implementing a plan called Washington's Highway Safety Plan/Target Zero which has a goal of achieving zero highway fatalities accompanied by significant reductions in serious collisions within twenty years. The projected amounts available for safety projects will decrease from $244 million in FY 07-09 to $150 million in FY09-11.
- **I-3 (Economic Initiatives).** This is an evolving category of transportation need and there is a great deal of interest in determining

how transportation investments can create job growth in Washington State. Despite the growing demand and timeliness of economic initiatives, WSDOT anticipates that it will be requesting no funding for this category of programs over the next 10 years. The I-3 budget represents an entire category of funding that has essentially been prioritized out of existence.

- **I-4 (Environmental Retrofits).** As explained in the Declaration of Paul Wagner, when the I-4 budget was created in the early 1990s, the fish passage barrier retrofit program was the first program that attempted to address environmental conditions by providing a dedicated funding source. Since the inception of the I-4 category, WSDOT has added several other dedicated funding programs to the I-4 environmental retrofits category: chronic environmental deficiencies (CED), stormwater, noise barriers, and habitat connectivity.

24. In addition to the fish passage retrofit barrier program, both the chronic environmental deficiencies (CED) program and the stormwater retrofit program provide benefits to fish survival. Chronic environmental deficiencies are locations along the state highway system where recent, frequent, and chronic maintenance needs are causing impacts to fish and fish habitat. An example of a CED is erosion of a road prism from a stream close to state highway. To address this safety problem, formerly WSDOT would fill the area with large rock or other material. However, that practice could damage aquatic habitat. Through the CED retrofit program,

WSDOT is often replacing this material with rough woody structures and incorporating other biologically-sensitive techniques to stabilize the road prism and to aid stream habitat. These techniques are designed to address long-term habitat needs of salmon and other organisms while eliminating the need for repetitive maintenance.

CULVERT REMEDIATION

25. WSDOT-owned culverts that are fish passage barriers are remediated through two different funding structures. First, fish barriers can be remediated as part of a capital construction project when the barriers fall within the boundaries of a highway construction project. This funding comes from the capital construction budget. Second, fish passage barriers can be addressed with funding from the WSDOT I-4 budget. Exhibit D shows the history of funding for the I-4 budget. The chart also illustrates the amount requested by WSDOT and the amount appropriated by the Legislature.[2]

26. Exhibits E and F chart the number of blocking culverts that have been repaired through construction projects and through the I-4 budget. Exhibit G is a chart showing the potential lineal habitat gained through barrier corrections through 2008.

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[2] The amount spent on culvert remediation in the course of a capital construction project is not tracked separately within the construction budget. For example, there would be a total budget for concrete but the amount of concrete used for the culvert work would not be segregated.

27. As the purchasing power of available revenue for new preservation and improvement in the Highway Construction Program has declined by between 35% and 45% over the last several years, WSDOT recommended increases in the funding for fish barrier inventory and replacement. At the same time, WSDOT increased the reach of the I-4 program by creating the Chronic Environmental Deficiency program. Habitat improvements for fish and investments in this category are on the increase at locations such as the Snoqualmie River at Fall City, the Hoh River south of Forks, the Sauk River near Darrington, the Nooksack River and Red Cabin Creek on US 20 near Rockport.

28. WSDOT also implemented the stormwater retrofit program within I-4 to improve the quality of water and reduce the velocity of water that was running off state highways into fish bearing streams. The WSDOT has also begun building a habitat connectivity program for wildlife with its' first project about to go construction and another ready to start design.

29. The FY 09-11 budget for I-4 has not been finalized at the time this declaration has been submitted. The Governor has proposed $17.9 million for the fish barriers in the I-4 budget. The Senate and House have both proposed $15.07 million for fish barriers in the I-4 budget. The budget reconciliation process will resolve this discrepancy, and I am assuming that the final budget will be somewhere within the range defined by these proposals.

30. The current budget proposals and projected budgets for I-4 and specifically for fish

passage barriers is attached. Exhibit H. Based on current revenue projections the future budgets for I-4 and for fish barriers is predicted to decline along with the rest of the transportation budget. The effect of the zero-sum situation can be seen within the budget projections for I-4. Historically, the line item for fish barriers has been 30% of the I-4 budget. Budget projections show fish barriers increasing to 50% of the I-4 budget. This increase is coming at the expense of the other environmental efforts of WSDOT in the I-4 budget.

CONCLUSION

31. WSDOT receives a limited amount of money to operate, improve, and maintain the State's transportation system. The vast majority of funding comes to the agency with specific restrictions on how the money can be spent. As described above, the demands on remaining funds dramatically exceed the amount that is available. The prioritization of scarce resources is done carefully and represents a delicate balance of competing interests.

32. Increasing the funding for culvert remediation would necessarily mean other important projects would be shorted to an even greater degree. WSDOT is dedicated to reducing the impact of the transportation system on salmon, but salmon is only one of the many important demands that the agency is required to fulfill. Within the limits of available resources, WSDOT is doing the best it can to fix culverts that are barriers to fish passage.

I declare under penalty of perjury that the foregoing is true and correct.

DATED the *3rd* day of *April* 2009.

s/Jeff Carpenter
JEFF CARPENTER, P.E.

EXHIBITS TO THE DECLARATION OF JEFF CARPENTER, P.E.

Exhibit A

Chart -- Governor's Proposed FY 2009-11 Operating and Capital Budgets for WSDOT

Exhibit B

WSDOT's MAP report card from 2004 - 2008.

Exhibit C

Photograph of bridge - deferred maintenance

Exhibit D

I-4 Budget History of Funding

Exhibit E

Chart -- "WSDOT Barrier Corrections Numbers Per Year"

Exhibit F

Chart -- "Cumulative View of WSDOT Barrier Corrections"

Exhibit G

Chart -- Potential Lineal Habitat Gain 1991 - 2008

Exhibit H

Current budget proposals and projected budgets for I-4 and specifically for fish passage barriers

The Honorable Ricardo S. Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, Defendant.	NO. C70-9213 Subproceeding No. 01-1 (Culverts) ADDENDUM TO THE DECLARATION OF JEFF CARPENTER, P.E. IN LIEU OF DIRECT TESTIMONY

I, Jeff Carpenter, P.E., declare as follows:

INTRODUCTION

33. On April 3, 2009, I executed the Declaration of Jeff Carpenter, P.E., in Lieu of Direct Testimony in *United States v. Washington* Subproceeding 01-1. I submit this Addendum to update information.

34. In paragraph 26 of my April 3, 2009 declaration, I referenced and attached as Exhibits E and F charts showing the number of blocking culverts repaired through construction projects and through the I-4 program and the total number of corrections. Since that time, it was determined that the total number of fish passage barriers corrections was 225. Exhibits E and F attached to this Addendum have been amended accordingly and reflect the correct numbers. Paragraph 26 also referenced Exhibit G, a chart showing the potential lineal habitat gained through barrier corrections through 2008. This chart

has also been corrected to accurately reflect the correct amounts and is attached to this Addendum as Exhibit G.

I declare under penalty of perjury that the foregoing is true and correct.

DATED the 22 day of September 2009.

s/Jeff Carpenter
JEFF CARPENTER, P.E.

EXHIBITS TO THE ADDENDUM DECLARATION OF JEFF CARPENTER, P.E.

Exhibit E

Chart -- WSDOT Barrier Corrections Numbers Per Year

Exhibit F

Chart -- Cumulative View of WSDOT Barrier Corrections

Exhibit G

Chart -- Potential Lineal Habitat Gain 1991 - 2008

The Honorable Ricardo S. Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, Defendant.	NO. C70-9213 Subproceeding No. 01-1 (Culverts) DECLARATION OF PAUL J. WAGNER IN LIEU OF DIRECT TESTIMONY

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I, PAUL J. WAGNER, declare as follows:

I. Summary

1. I am the manager of the Washington State Department of Transportation (WSDOT) fish passage barrier correction program. For many years, WSDOT has recognized the need to provide fish passage at stream crossings. WSDOT has worked to correct fish passage barriers as part of highway improvement projects and through a separate dedicated-fund fish passage correction program. I

manage the dedicated-fund program and will describe it in this declaration, and my branch provides support to WSDOT regions in their work with transportation project development. Please refer to the Declaration of Allison Hanson for information about fish passage barrier corrections that occur as part of larger highway improvement projects. Through its dedicated-fund program, WSDOT has invested over $47 million dollars for the inventory, prioritization, and correction of high priority fish passage barriers since 1991, when concentrated efforts began. Those efforts, along with the correction of fish passage barriers in connection with highway improvement projects, have provided 232 barrier corrections and improved fish access to more than 754 miles of stream habitat in Washington State.

II. Witness Qualifications and Experience

2. I am the Biology Branch Manager in WSDOT's Environmental Services Office, a position I have held since 1993. I am the senior agency lead for implementing and complying with federal and state regulations related to biological resources, with an emphasis on fish passage, wildlife habitat connectivity, endangered species, wetlands, streams, and other aquatic habitats. I am responsible for four WSDOT programs, which include 25 full-time employees and about 16 seasonal positions. One of these programs, the Stream Restoration Program, includes WSDOT's dedicated-fund fish passage barrier correction program. I work with several national forums and work groups as part of the National Academies of Sciences, and other organizations, addressing the ecological effects of roads. I currently chair the International Conference

on Ecology and Transportation. I interact with many professionals involved with transportation and ecology in the United States and other countries, and I have spoken at educational seminars in the United States and Canada. I have over 20 years of experience as a professional biologist. My resumé is attached as Exhibit A.

3. I hold a Bachelor of Science degree in Natural History, which is a double major in Biology and Geology, from Juniata College in Pennsylvania. I started my career working on government projects related to endangered species conservation and wildlife studies. I joined WSDOT in 1990 as a biologist and was promoted to my current position as Biology Branch Manager in 1993.

4. The Biology Branch is a part of WSDOT's Environmental Services Office. That office coordinates WSDOT's agency-wide efforts to address environmental issues in its programs and projects, including fish passage, air quality, wetlands, stormwater management, hazardous materials, erosion control, wildlife migration, and historical and cultural preservation. WSDOT has about 250 full-time employees statewide who focus on environmental services. Many of them are biologists with substantial field experience. WSDOT's environmental efforts have received national recognition from the Federal Highway Administration, the National Association of Environmental Professionals, the American Council of Engineering Companies, and other organizations. For example, in 2003, FHWA presented WSDOT and its partners, including the Nisqually and Squaxin Island Tribes, with an Environmental Excellence Award for the Indian Creek Stormwater Treatment

Facility near I-5 in Olympia. My team and I have received several awards from the Federal Highway Administration, including a 2002 award for a fish passage project. A list of those awards is included in Exhibit A.

III. History of Washington State Highway Culvert Design

5. In my work as the WSDOT Biology Branch Manager, I have become generally familiar with culvert function and the history of culverts in the Washington State highway system. I have also spoken with Matthew J. Witecki, the WSDOT Chief Hydraulic Engineer, who is intimately familiar with culvert design methods. I have examined the declaration that Mr. Witecki filed in this Subproceeding in 2006 (Doc. No. 18553/288, filed August 14, 2006). The following paragraphs are based on my personal knowledge and what I learned from Mr. Witecki.

6. According to WSDOT's transportation data office, there are 7,044 centerline miles in the state highway system, managed by WSDOT. While these are some of the most well-known roads, they are only a small portion of those in the state. There are 83,432 miles of road under the jurisdiction of cities, counties, and others. Many Washington State highway culverts were installed decades ago. WSDOT used standard engineering methods when it installed them, but some culverts designed according to those methods are now considered to be partial or complete barriers to fish passage. In part, that is because fish passage criteria have evolved over time, and designs once thought to be passable are now known to block

fish passage under some circumstances, as described in the Declaration of Robert Barnard, P.E. Another reason that some culverts are now fish passage barriers is that streams are dynamic systems, and conditions at stream crossings can change and cause a passable culvert to become a barrier. Sometimes that happens slowly, over a long period of time, and sometimes it is triggered by certain high flow events. Culverts can become partial or complete barriers to fish passage when they do not adequately respond to change.

7. Culverts can impede fish passage because of excessive drops at the outfall ("perching"), excessive velocity inside the culvert, or inadequate water depth. Changes in the watershed can cause those conditions. In many Western Washington watersheds, forests have given way to suburban landscapes where falling rain meets roof, street, or parking lot instead of spongy soil. Those changes can increase the intensity of runoff entering a stream, which can increase water velocity in culverts. That can lead to scouring of the stream bed at culvert outfalls, high water velocity during high flows, and shallow water depths within or downstream of the culvert during periods of low flows. All of those conditions can block fish movement. Culverts can also become fish barriers due to structural failure or debris blockage.

8. Attached as Exhibit B are photos of several WSDOT-owned culverts which exemplify scour, velocity, and low flow problems. In my professional opinion, these culverts would not have been considered fish barriers when they were originally permitted and built.

9. Dating back to at least the 1960s, WSDOT has relied on a Federal Highway Administration (FHWA) publication entitled Hydraulic Engineering Circular #10 (HEC #10). The earliest version of HEC #10 in WSDOT's library is dated March 1965 (attached as Exhibit C). WSDOT used the procedures identified in the then-current version of HEC #10 as the basis for Chapter Three of the WSDOT *Hydraulics Manual* – "Culvert Design"— which relates to the use of hydraulic criteria for sizing culverts. The WSDOT manual contains the same culvert sizing charts and guidance originally set forth in HEC #10. It is my understanding that the protocols and techniques set forth in HEC #10 are generally accepted as the industry standard for the design of road culverts for hydraulic purposes.

10. Virtually all of the WSDOT culverts now identified as barriers to fish passage were designed according to the FHWA design standards promulgated in HEC #10. At no time has FHWA notified WSDOT that the federal design standards failed to provide fish passage or that culverts designed pursuant to the standards might violate treaty fishing rights.

11. In the early 1990s, the Washington Department of Fisheries (WDF) notified WSDOT that, in some circumstances, culverts designed according to the guidelines in HEC #10 failed to provide for adequate fish passage. A number of interagency meetings took place, and ultimately, WSDOT found WDF's position compelling and adopted the WDF fish passage culvert design standards as they were developed.

12. In 1999 and 2003, the Washington Department of Fish and Wildlife (WDFW) published new culvert design guidelines specifically intended to accommodate fish passage. A copy of the 2003 WDFW manual *Design of Road Culverts for Fish Passage* is attached to the Declaration of Robert Barnard, P.E. WSDOT has modified its *Hydraulics Manual* and training materials to reflect the WDFW's fish-friendly design methods. Attached as Exhibit D are excerpts from the current WSDOT *Hydraulics Manual.* Chapter Seven addresses fish passage.

13. In July 2007, the Federal Highway Administration published *Design for Fish Passage at Roadway-Stream Crossings: Synthesis Report.* It describes the state-of-the-art practice for fish passage, referencing Washington State for some leading examples. Excerpts of that report are provided as Exhibit E to the Declaration of Robert Barnard, P.E. I understand that FHWA has been working on a new Hydraulic Engineering Circular that would describe culvert design standards to accommodate fish passage. It is still in development and has not yet been published, but it is expected to reflect the information in the 2007 synthesis report.

IV. How WSDOT's Fish Passage Barrier Correction Programs Began

14. Before 1991, WSDOT corrected fish passage barriers when they were encountered as part of projects to improve highway safety and mobility, or when the culvert required work due to structural problems. No formalized fish barrier inventory

process existed. Professional judgment as part of permitting highway projects largely guided determinations of fish passability and the design of passage corrections. This meant corrections had to wait until a transportation need coincided with the location of a fish barrier, and a construction project was implemented that could include the barrier correction. This approach remains the only approach used by almost every other state in the country.

15. As described in the Declaration of Paul Sekulich, Ph.D., Washington State recognized that more needed to be done to address fish passage barriers. In December 1990, WSDOT entered into a Memorandum of Understanding ("MOU") with what is now known as the Washington Department of Fish and Wildlife (WDFW). The 1990 MOU is provided as Exhibit B to Dr. Sekulich's declaration. It sets out the agencies' process for working together to implement state laws for the protection of fish, including fish passage. As described in the Declaration of Allison Hanson and the exhibits accompanying it, the MOU has been updated several times. The current version was executed in 2008.

16. WSDOT's program for identifying and correcting fish passage barriers began in 1991, when the Washington State Legislature directed it to correct six known fish barriers during the 1991-1993 biennium. The 1991 legislation is attached as Exhibit C to the Declaration of Paul Sekulich, Ph.D. For the first time, WSDOT developed projects whose sole objective was to address environmental needs. The

amounts of $105,000 and $280,000, respectively, were allocated for the two years of the biennium for inventory and correction of fish passage barriers. In 1993, these "stand-alone" or "dedicated" fish passage projects formally became a separate program now referred to as the Environmental Retrofit Program, or "I-4" Program.

17. The stand-alone fish passage correction projects of the early 1990s led to the creation of a separate WSDOT program, with separate funds, to address a variety of environmental problems in the state highway system. Today, the I-4 Program has expanded to include stormwater treatment, stream habitat improvement, highway noise attenuation, and wildlife habitat connectivity, as well as fish passage.

18. To my knowledge, WSDOT's "stand-alone" fish passage correction program was the first among transportation agencies in North America to define transportation projects based on an environmental need. Oregon has since implemented a fish passage program modeled after WSDOT's, but otherwise it remains a unique approach.

V. The Current WSDOT Fish Passage Barrier Correction "I-4" Dedicated Fund Program

A. Introduction

19. WSDOT's fish passage barrier correction program is managed through close cooperation and partnership with WDFW. Before correcting a culvert,

WSDOT obtains information about the culvert which has been collected by WDFW. The program has three main areas of work: Inventory, prioritization, and correction. WDFW's share of that work is described in the Declarations of Paul Sekulich, Ph.D., and Michael R. Barber. I will describe WSDOT's share.

B. Inventory: Finding and Evaluating Culverts that Block Fish Passage

20. WSDOT funds staff at WDFW to inventory and prioritize fish barriers for correction. This effort has grown significantly over time as our understanding of the problem has increased. Since 1991, WSDOT has invested about $9 million for fish passage barrier inventory and prioritization. In the 2007-09 biennium, the funding for this work was over two million dollars. The 2007-09 funding agreement between WSDOT and WDFW is provided as Exhibit B to the Declaration of Michael R. Barber.

21. As explained in the Declaration of Paul Sekulich, Ph.D., the inventory has undergone several expansions. The first inventory focused only on salmon, in streams up to a 7% gradient, which was understood to be the extent of salmon use. The search for barriers in that inventory was completed statewide in May 1994. At that point, WDF had inspected 1,333 highway culverts at fish-bearing stream crossings and identified 340 barriers (either partial or complete) statewide.

22. As a result of the merger of WDF with the Washington Department of Wildlife, in 1995

WDFW expanded the scope of the fish passage program to include streams up to a 12% gradient, as steelhead and resident trout could swim up this steeper gradient. This constituted a significant increase in survey area, and the survey was expanded for the 12% gradient. Although the expanded survey was not yet complete, by June 1997, WDFW had inspected 1585 highway culverts at fish-bearing stream crossings and identified 509 barriers (either partial or complete) statewide.

23. In 1998 WDFW expanded the scope yet again to include streams up to a 20% gradient, in response to new rules of the Washington Forest Practices Board. WSDOT funded additional survey crews, but the scale of this expansion meant it would take over ten years – until fall of 2007 – before the statewide inventory would be complete.

24. The June 2008 *WSDOT Fish Passage Inventory Progress Performance Report* (attached as Exhibit E) shows that, since 1991, inventory crews have inventoried all 7,044 miles of the state highway system, inspecting 6,469 stream crossings, 3,185 of which were found to be fish-bearing streams. As of March 25, 2009, WDFW records show a statewide total for WSDOT of 1,878 fish passage barriers. Of those, 1,482 have at least 200 meters of fish habitat upstream. That is more than five times the quantity identified in 1994 when the survey was initially thought to be complete for salmon. The following table shows the current status in the *United States v. Washington* Case Area:

Fish Passage Barrier Culverts Within WSDOT Rights-of-Way In the *United States v. Washington* Case Area				
Culverts that block > 200 meters of salmon and steelhead habitat	Culverts that block > 200 meters of nonanadromous fish habitat	Culverts that block ≤ 200 meters of fish habitat	Culverts that block an unknown amount of habitat	Total
807	122	279	7	1,215

25. When WDFW inspects a culvert, it may determine whether the culvert is a partial or complete barrier to fish passage. For further explanation of WDFW's distinctions between a partial and complete barrier, see ¶ 16 of the Declaration of Paul Sekulich, Ph.D. Approximately 50% of the WSDOT fish passage barrier culverts statewide, as well as in the *United States v. Washington* Case Area, are considered partial barriers. They may impede fish of a certain size, for part of the year, or at certain stream flows. Partial barriers are still identified as fish passage barriers in WSDOT's program. A photograph of a partial barrier to fish passage is attached as Exhibit F.

26. If a culvert blocks fish passage, the next step is to determine how much habitat it blocks. If an initial assessment shows that the culvert blocks more than 200 meters of habitat, it gets put on the list for a more extensive habitat assessment under one of the methods described in WDFW's *Fish Passage Barrier*

and Surface Water Diversion Screening Assessment and Prioritization Manual (2000 version attached as Exhibit E to the Declaration of Paul Sekulich, Ph.D.). As described in the Declaration of Michael R. Barber, the habitat assessment process is labor intensive and still underway. WDFW currently has three crews working full time on these surveys. WDFW has conducted habitat assessments on approximately 34% of the WSDOT fish passage barrier culverts that block more than 200 meters of habitat in the *United States v. Washington* Case Area. WDFW's current projection for the completion of the habitat surveys is 2013 in the *United States v. Washington* Case Area and 2015 statewide.

C. Using the Fish Passage Priority Index to Decide Which Culverts to Fix First

27. To decide the order in which to fix the identified barriers, WSDOT uses several pieces of information. One of them is the Priority Index number assigned to the culvert by WDFW. For an explanation of the development of the Fish Passage Priority Index and how WDFW calculates Priority Index (PI) numbers, please refer to ¶¶ 21-28 of the Declaration of Paul Sekulich, Ph.D. Prioritization is an important part of the WSDOT program because the scale of the fish passage problem is large, corrections are expensive, and WSDOT wants to use its limited resources to provide the best benefit to fish.

28. The PI does incorporate a project cost variable, with projects grouped into three categories: less than $100,000, $100,000 to $500,000, and over $500,000. In the 1990s, that was a useful distinction for WSDOT. For the last several biennia, however, the

vast majority of the WSDOT correction projects have cost more than $500,000, so the cost variable generally has little or no influence on the PI calculation for WSDOT culverts today.

29. The value of the PI is most greatly influenced by the number of fish species present and the amount of fish habitat upstream of the culvert. Because habitat assessments have not been completed for all WSDOT fish passage barrier culverts, PIs have not been calculated for every fish barrier. In the absence of complete habitat assessment information, it is possible to create a Surrogate PI (SPI) using Geographic Information Systems (GIS) data. WDFW sometimes uses surrogate PIs to decide where to focus habitat assessment efforts before identifying projects for scoping. But the PI is considered more accurate and is used to help form the basis of programming decisions.

D. Scoping and Planning Fish Passage Barrier Corrections

30. Once fish passage barriers are identified and assigned Priority Index numbers, barriers with higher PIs undergo preliminary evaluation, or "scoping," to develop an agreed design concept to fix the culvert, with an estimated cost. Scoping starts several years before the completion of a detailed design. The scoping process begins when WDFW provides one or more conceptual designs to WSDOT that will meet fish passage needs at a particular site. Please refer to the Declaration of Michael R. Barber for a description of the initial scoping that WDFW conducts. An on-site "pre-scoping" meeting is then held to evaluate the specifics of the site, and to discuss

possible solutions. Attendees may include Tribes, local agencies, WDFW, and WSDOT. Cost estimates are developed for the correction design options. The final decision about which option to pursue is determined by agreement between WSDOT and WDFW.

31. WSDOT and WDFW have developed a stepwise process to help coordinate scoping and development of I-4 fish passage barrier corrections. A flow chart that depicts the I-4 scoping process is attached as Exhibit G.

32. When projects have been scoped, they can be proposed for funding and included for design and construction in WSDOT's Ten-Year Plan. Although culvert PIs are a key factor that informs the decision of how to sequence barrier corrections in the I-4 Program, the PI is not the sole factor considered. As described in the Declarations of Paul Sekulich, Ph.D., and Michael R. Barber, other factors are important, as well. The presence or absence of other barriers in the watershed carries weight, for example. Most WSDOT barriers with a PI greater than 20 and no other barriers in the watershed have already been fixed. The opportunities to work with other entities to fix several culverts or habitat problems at once can elevate a culvert's priority. For efficiency, WSDOT may fix several state highway culverts in a single project even though some may have low PIs. Constructability challenges, such as difficulty with right of way, access, or construction detours, can delay a project. For example, WSDOT must sometimes get permission to use city streets as a detour route while a culvert is constructed. Just today, I learned that, for two culvert projects that WSDOT expected to

construct in 2009, the City of Poulsbo has authorized WSDOT to use its streets as a detour route only if the work is done in 2010. Sometimes, projects are programmed to fit available funds. Some very high cost projects are delayed because they exceed the biennial budget. An example is the SR 3 crossing of Chico Creek, a Tributary of Dyes inlet in Kitsap County, which would require four bridges and is estimated to cost over $29 million to correct.

E. Designing, Constructing, and Paying For A Structure That Restores Fish Passage

33. Fish passage corrections in the I-4 Program are designed according to the guidance in the manual *Design of Road Culverts for Fish Passage*, which WDFW published in 2003 (Exhibit B to the Declaration of Robert Barnard, P.E.). Since 1992, WSDOT has fixed more than 70 high-priority fish passage barriers under the I-4 dedicated-fund program. WSDOT and WDFW publish annual reports describing the program and its newest completed projects. The most recent report, issued in June 2008, is attached as Exhibit E. Please see the Declaration of Jeff Carpenter for a description of the financial underpinnings of the program.

34. Approaches to fish passage design have evolved since the first I-4 corrections were constructed in the early 1990s, reflecting the advances in our understanding about the biological needs of fish as well as our experience over time with correction methods. WSDOT uses all three culvert design methods described in the WDFW culvert design manual: the hydraulic, no-slope, and stream simulation methods. Please see the Declaration of

Robert Barnard, P.E., for a description of these methods.

35. The hydraulic design method was the principal method used in the early years of WSDOT's I-4 Program. Today, WSDOT uses it primarily to retrofit existing culverts to improve passage without replacing the culvert with a new structure. Exhibit H includes photos of WSDOT culverts retrofitted with weirs or baffles. Weirs cause water to back up, while baffles interrupt its flow. Both devices slow the water velocity, which makes it easier for fish to get through. Because there are no expenses for excavation, new structure placement, or traffic control, such retrofits are economical to construct, but they can collect debris, become damaged, and require regular maintenance. For those reasons, their use has diminished in WSDOT's I-4 Program. Today, the hydraulic option is generally considered only where there are site-specific limitations, such as adjacent developed properties or very deep roadway fill, or where the cost for another type of correction would be many millions of dollars.

36. The cost of fixing a culvert using the hydraulic design option varies greatly depending on the situation. In the early 1990s, some hydraulic culverts were installed for under $50,000. In 2007, however, a hydraulic correction was constructed on SR 92 at Catherine Creek for $377,749.

37. In its current I-4 Program, WSDOT most often corrects fish passage barriers by replacing a barrier culvert with a new culvert designed under the no-slope or stream simulation methods. The Declaration of Robert Barnard, P.E., describes these

design methods. They provide a more natural and a wider span for high flows than does the hydraulic method, and they also allow for some channel movement. They provide fish passage by approximating natural stream conditions within the culvert. No-slope and stream simulation culverts also need less maintenance than hydraulic retrofit structures.

38. No-slope culverts have been a good option for WSDOT. They provide fish passage for all species at all flows, they require less maintenance than weirs and baffles, and they are generally less expensive than stream simulation culverts. No-slope culverts must be at least 1.25 times as wide as the channel bed, and WSDOT often designs them wider than that. State Route 112, along the Strait of Juan de Fuca west of Port Angeles, offers some examples of recent no-slope installations:

Recent No-Slope Culvert Installations on State Route 112			
Mile Post	**Stream**	**Year Constructed**	**Cost**
24.91	Unnamed tributary to Pysht River	2006	$647,773
32.02	Jim Creek	2004	$870,000
54.35	Bear Creek	2006	$666,151

The Jim Creek culvert is depicted in Exhibit H.

39. In some cases, the most expensive part of a culvert replacement project is excavation and traffic control, not the cost of the actual structure. In those cases, the stream simulation culvert design option is often selected even if it would cost a little more than a no-slope culvert. As described in the Declaration of Robert Barnard, P.E., WDFW's stream simulation design method is nationally recognized as the state of the art for culvert design. It provides passage for all fish species at all relevant flows, and allows for other ecological functions associated with streams. Most of the culvert corrections that WSDOT and WDFW are currently scoping use stream simulation designs. Examples of recent stream simulation installations are on SR 93 at Stevens Creek ($634,398, installed 2005), and a pair of culverts on SR 20 at Frazer Creek and Beaver Creek ($1,401,830, installed 2006).

40. WSDOT uses bridges when the stream simulation criteria would dictate a span of more than 20 feet. Bridges are also used for unconfined channels or highly dynamic stream systems. Bridges can provide benefits beyond fish passage, but they are also the most expensive fish passage barrier correction option. In 2004, a bridge was installed for fish passage on Tibbetts Creek under I-90 at a cost of $5,536,555. In 2005, a bridge was installed for fish passage on Skobob Creek on SR 106 at a cost of $1,731,000. Both bridges, and the culverts they replaced, are depicted in Exhibit I.

41. The cost of fish passage barrier correction projects has risen significantly over time. In the early 1990s, the I-4 Program started with projects that were more easily installed, and relied largely on retrofits of existing culverts. As the

program progressed, we have encountered more complex situations and relied on more extensive corrections, such as complete replacement. Inflation and rising materials costs have accelerated the increase in the cost of the program.

42. WSDOT has increasingly used full replacement for barrier culverts as the I-4 Program has matured. Of the 20 dedicated projects currently planned for design and/or construction in the 2009-2011 biennium, 17 are for stream simulation or bridge corrections. (See Exhibit J.)

43. The pace of WSDOT culvert corrections under the I-4 Program is affected by some non-monetary factors that WSDOT cannot control. One of those is state and federal regulatory agencies' seasonal timing restrictions for performing construction work in fish-bearing streams. For example WDFW currently allows construction work in Jimmycomelately Creek, a salmon-bearing stream in Clallam County, only during the month of August.

VI. WSDOT's Leadership in Fish Passage

44. When the WSDOT I-4 fish passage barrier correction program began in 1991, WSDOT had one Biologist in the Headquarters Design Office coordinating the work. Today, WSDOT has three Biologists and two Hydrologists in the Headquarters Environmental Services Office involved in this work. They work with WSDOT regional design offices and with WDFW staff in Olympia and regional offices.

45. WSDOT has supported research to increase our understanding of how best to provide fish passage at stream crossings and help reduce

transportation related effects to fish. Exhibit K lists research projects funded by WSDOT that were related to fish passage and fish protection. Two of those research projects are described in ¶ 49 of the Declaration of Paul Sekulich, Ph.D.

46. WSDOT's fish passage barrier retrofit program is among the most extensive efforts to address fish passage in the country and it is unique in several ways. Many states began to consider fish passage needs at their road crossings only in the last five years or so. Some are just beginning to inventory their culverts, using methods developed by WDFW and WSDOT as the basis for their inventory.

47. Washington has constructed more crossings specifically to accommodate fish passage than any other state in the United States. This was noted recently at page 18 of *Report 615: Evaluation of the use and Effectiveness of Wildlife Crossings*, published by the Transportation Research Board of the National Academies in 2008 (excerpts attached as Exhibit L).

48. In February 2006, FHWA hosted a Fish Passage Summit in Denver, Colorado. Representatives from many states attended, including staff from WSDOT and WDFW. Jon Peterson of my staff attended, and Robert Barnard of WDFW was one of the speakers. The efforts of several states were presented, which were modeled after parts of the Washington programs for inventory and correction. Many programs involved a less thorough inventory, less rigorous corrections standards, and no stand-alone or dedicated programs like WSDOT's I-4 Program, however.

49. The FHWA report *Design for Fish Passage at Roadway-Stream Crossings: Synthesis Report*, published in 2007, compiles information on the state of the practice for fish passage. The guidance developed in Washington for barrier inventory, as well as design of Stream Simulation and No Slope Culverts, are cited among the leading examples. Excerpts from this report are provided as Exhibit E to the Declaration of Robert Barnard, P.E.

VII. Conclusion

50. WSDOT has been proactive in addressing the need for fish passage. Through WSDOT's dedicated (I-4) fish passage program alone, the State of Washington has invested over $47 million for fish passage barrier inventory, prioritization, and correction since 1991. It has invested still more through other types of transportation projects. As depicted in Exhibits M and N, WSDOT has implemented 232 fish passage corrections, including 72 stand-alone corrections, improving access to over 754 lineal miles of stream habitat statewide. We have supported studies to improve our knowledge of fish passage and have revised our approaches to reflect new information. Our program is unique and nationally recognized for its leadership.

I declare under the penalty of perjury that the foregoing is true and correct.

Executed on this *2nd* day of April, 2009, at Olympia, Washington.

s/Paul J. Wagner
PAUL J. WAGNER

EXHIBITS TO THE DECLARATION OF
PAUL J. WAGNER

Exhibit A
Resumé of Paul J. Wagner (Bates Nos. T1013589-93)

Exhibit B
Three photos of velocity, scour, and low flow at WSDOT culverts, with figures showing the cost of correcting these fish passage barriers (Bates Nos. T1013764-66)

Exhibit C
Capacity Charts for the Hydraulic Design of Highway Culverts, Hydraulic Engineering Circular No. 10 (Bureau of Public Roads, March 1965) (Bates Nos. T1013767-854)

Exhibit D
Excerpts from *Hydraulics Manual*, M 23-03.01 (Washington State Department of Transportation, June 2007) (Bates Nos. T1013855-63)

Exhibit E
Washington State Department of Fish and Wildlife/ Washington State Department of Transportation, *WSDOT Fish Passage Inventory Progress Performance Report* (June 2008) (Bates Nos. T1001862 – T1002020)

Exhibit F
Photo of a partial fish passage barrier culvert under SR 8 at Wildcat Creek (Bates No. 1013864)

Exhibit G
I-4 Flow Chart (Bates No. T1002021)

Exhibit H
Eight photographs showing one fish-blocking culvert, three hydraulic design culverts, two no-slope culverts, a stream simulation culvert, and a bridge (Bates Nos. T1013865-72)

Exhibit I
Five pages of before-and-after photos of WSDOT fish passage barrier correction projects (Bates Nos. T1013873-77)

Exhibit J
Fish Passage Pre-Scoping List (January 7, 2009) (Bates No. T1013878)

Exhibit K
List of environmental research projects that WSDOT has sponsored (Bates Nos. T1013879-81)

Exhibit L
National Highway Cooperative Research Program 615: Evaluation of the Use and Effectiveness of Wildlife Crossings (Transportation Research Board of the National Academies, 2008), Cover page and Chapter 2 (Bates Nos. T1013882-97)

Exhibit M
Chart of WSDOT Barrier Corrections Numbers Per Year

Exhibit N
Chart of Cumulative View of WSDOT Barrier Corrections

The Honorable Ricardo S. Martinez

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, Defendant.	NO. C70-9213 Subproceeding No. 01-1 (Culverts) ADDENDUM TO THE DECLARATION OF PAUL J. WAGNER IN LIEU OF DIRECT TESTIMONY

I, PAUL J. WAGNER, declare as follows:

51. On April 2, 2009, I executed the Declaration of Paul J. Wagner in Lieu of Direct Testimony in *United Statse [sic] v. Washington* Subproceeding 01-1. I submit this Addendum to update information.

52. In paragraph 1 of my April 2, 2009 declaration, I stated that 232 barrier corrections had been completed since 1991 which improved access to more than 754 miles of stream habitat. Since that time, my staff determined that the correct number of corrections of fish passage barriers to be 225 with improved access of over 699 miles of stream habitat.

53. In paragraph 24 of my April 2, 2009 declaration, I referenced and attached as Exhibit E the 2008 *WSDOT Fish passage Inventory Progress Performance Report*. Since signing my declaration, the 2009 *WSDOT Fish Passage Inventory Progress Report*

was published and is attached to this Addendum as Exhibit O.

54. In paragraph 54, I stated that WSDOT has implemented 232 barrier corrections, including 72 stand-alone corrections, improving access to over 754 miles of stream habitat statewide. since that time, my staff determined that the correct number of corrections of fish passage barriers to be 225 (72 dedicated I-4 corrections and 153 corrections through other funding sources) improving access of over 699 miles of stream habitat. Exhibits M and N attached to this Addendum have been amended accordingly and reflect the correct numbers.

I declare under the penalty of perjury that the foregoing is true and correct.

Executed on this *22nd* day of July, 2009, at Olympia, Washington.

s/Paul J. Wagner
PAUL J. WAGNER

EXHIBITS TO THE ADDENDUM
DECLARATION OF PAUL J. WAGNER

Exhibit M
Chart of WSDOT Barrier Corrections Numbers Per Year

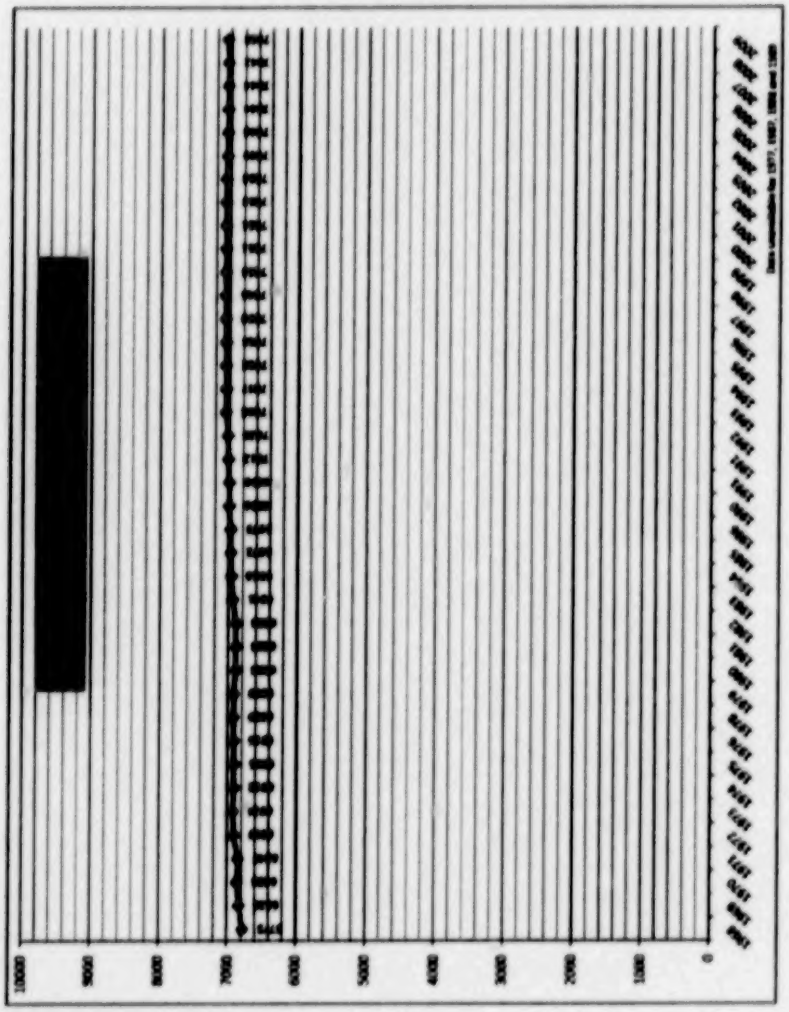
Exhibit N
Chart of Cumulative View of WSDOT Barrier Corrections

Exhibit O
Washington State Department of Fish and Wildlife/ Washington State Department of Transportation, *WSDOT Fish Passage Inventory Progress Performance Report* (July 2009) (Bates Nos. T1014085 – T1014252)

Case area summary of up and down stream barriers associated with the state owned barrier culverts used by Tyson Waldo to generate Table 1. Based on the revised list (315 of 348).		
Downstream	Upstream	Total
220	1370	1590

WRIA summary of the up and down stream barriers associated with the state owned barrier culverts (Base Culverts) used by Tyson Waldo to generate Table 1. Based on the revised list (315 of 348).			
WRIA	Base Culverts	DS Barriers	US Barriers
01	20	17	128
03	9	8	102
04	6	9	10
05	8	7	60
06	2		8
07	25	33	106
08	24	28	317
09	2	3	
10	9	11	65
11	3		16
13	1		14
14	10	4	41
15	44	30	162
16	12	6	8
17	19	17	78
18	9	10	39
19	15	2	77
20	27	11	22
21	16	1	9
22	44	12	85
23	10	11	23
Total	315	220	1370

WSDOT – Historical Center Line Miles
1868-2009



State's Exhibit W-188
Page 000001
Case No. 70-9213, Subproceeding 01-1

THE HONORABLE RICARDO S. MARTINEZ

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiff, vs. STATE OF WASHINGTON, at al. Defendant.	NO. C70-9213 Subproceeding 01-1 DECLARATION OF MIKE HENRY REGARDING PRE-FILED, WRITTEN DIRECT TESTIMONY

I, MIKE MCHENRY, declare as follows:

1. I was asked by counsel for Plaintiff Tribes in this sub-proceeding to testify as an expert witness on behalf of the Tribes.

2. As agreed to by the parties and ordered by the Court, my direct testimony is in writing. A true and complete copy is attached to this declaration.

Pursuant to 28 U.S.C. § 1746 I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

EXECUTED on this *10th* day of October, 2009 at *Pt. Angeles*, Washington.

s/Mike McHenry
MIKE MCHENRY

United States v. Washington
United States District Court
Western District of Washington
No C70-9213, Subproceeding 01-1 (Culverts)

Written Direct Testimony Of Mike McHenry
Habitat Program Manager
Lower Elwha Klallam Tribe
Witness For Plaintiff-Intervenor Tribes

Testimony Prepared March 27, 2009

Amended October 10, 2009

I. Introduction and Summary.

I have been asked to serve as a regional expert witness for the Washington treaty tribes on the culvert case. In that capacity I will provide my experiences in assessing watershed, habitat conditions and fish populations in Olympic Peninsula watersheds. Specifically, I will focus on the process of culvert inventory, assessments and restoration. I also provide examples of the ecological effects of culverts on stream habitat and fish populations based on my observations in watersheds of the Olympic Peninsula. The Olympic Peninsula contains watersheds that have significant potential to support anadromous fish. Many of these watersheds have been impacted by a variety of historic and ongoing land uses that have degraded and continue to limit those populations of anadromous fish important to Native American tribes. Those impacts include barriers caused by culverts under roads. The Lower Elwha Klallam Tribe operates a fisheries program with habitat assessment, monitoring and restoration capabilities. The Tribe uses a scientific process to identify and prioritize restoration projects at the watershed scale. As discussed below in Section IV below, the scientific literature recommends that restoration be conducted in a hierarchical fashion and at the watershed scale to achieve the maximum likelihood of success. The correction of human caused barriers is generally recognized as the second highest priority for restoring habitats used by Pacific salmon (following the protection of existing functional habitats). Specific methods are available to identify and prioritize culvert corrections and methods used by the Washington Department of Fish and Wildlife are

widely accepted. However, problems associated with the accuracy of existing data bases used to identify streams and culvert locations likely result in underestimation of total habitat affected. Limitations in agency budgets have historically constrained barrier culvert corrections and have forced managers to implement cost-effectiveness measures to determine prioritization for culvert barrier corrections. The correction of culvert barriers is particularly important in the Pacific Northwest as there are literally thousands of barriers. Correction of barriers to salmon migration often results in a rapid response by colonizing salmon and has been shown to quickly result in increases in juvenile and adult salmon.

II. Qualifications.

I hold a Bachelor of Science degree from Humboldt State University (Fisheries 1983) and a Masters of Science degree from New Mexico State University (Wildlife Science 1986). I am currently employed by the Lower Elwha Klallam Tribe as the fisheries habitat program manager. In that capacity I am responsible for a number of activities, including: 1) reviewing and determining the effects of land use activities on treaty protected fish and wildlife resources, 2) assessing watershed, habitat and fish population conditions, 3) identifying, designing and implementing restoration actions that will improve resource conditions for fish and shellfish, 4) conducting long term monitoring and research on habitat and biological populations, 5) managing program personnel, budgets, and grants necessary to support the habitat program and 6) participating in watershed planning and other processes to advance

protection and restoration of fish and wildlife resources. I have worked for the Tribe in this capacity since 1991. Previous to this position I was employed by the Northwest Indian Fisheries Commission, Idaho Department of Water Quality and the US Forest Service Intermountain Research Station in resource protection, fish population and fish habitat monitoring and research.

My background has given me broad experience in a number of areas pertinent to assessing the effects of watershed management on fish and their habitats including Pacific salmonids. I have twenty years of direct experience working in Olympic Peninsula watersheds that includes a variety of monitoring, assessment and research roles including the assessment, inventory and correction of fish passage barriers including those caused by culverts. I have conducted or have assisted with the inventories of culvert barriers on three Olympic Peninsula watersheds (Salt, Pysht, Clallam). I have also conducted numerous assessments at dozens of other watersheds in the states of Washington and Idaho. I have also been increasingly involved in management of watershed scale restoration efforts designed to improve fish habitats and watershed conditions. These projects include the correction of fish passage barriers by the replacement of barrier culverts with bridges and new passage structures that meet fish passage requirements. These barrier projects occurred in the Salt Creek, Deep Creek, East Twin River, Lyre River and the Pysht River watersheds. I am also intimately involved with planning for the removal of two dams on the Elwha River and the

subsequent restoration of native salmonid populations in that river drainage.

III. Olympic Peninsula Habitat Overview.

The Olympic Peninsula contains numerous watersheds supporting diverse populations of Pacific salmon. The largest watersheds radiate off the core Olympic Mountains which rise from sea level to over 7,800' in height at Mount Olympus and include the Hoh, Queets, Quinault, Elwha and Sol Duc rivers. The headwaters of these rivers have been provided federal protection by Olympic National Park (and its predecessors), since prior to statehood. Because of this level of federal protection, large areas of the Olympic Peninsula have been largely spared from the effects of development. Not surprisingly the watersheds with the greatest levels of federal protection generally support the highest populations and greatest diversity of Pacific salmon (McHenry et al. 1996)[1]. The Elwha and Skokomish Rivers are generally thought to be an exception to this rule as construction of mainstem hydroelectric dams without fish passage facilities on these rivers has dramatically affected their ability to produce anadromous fish.

Dozens of other salmon bearing watersheds of various sizes can also be found on the Olympic Peninsula. These also were historically productive for Pacific salmon and include lesser known watersheds such as Pysht, Quilcene, Morse, Dickey, Hoko and Ozette to

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[1] McHenry, M.L., J. Licatowich and R. Hagaman. 1996. Status of Pacific Salmon and their habitats on the Olympic Peninsula, Washington. Lower Elwha Tribe, Fisheries Department, Port Angeles, Washington.

name a few. Many of these watersheds drain outside of the federally protected central Olympics and have historically had little or no protection from impacts associated with historic land uses such as logging, agricultural development, urban development, and road construction, including culverts. These activities have generally degraded the productive capacity of Olympic Peninsula watersheds to produce Pacific salmonids and can be referred to as cumulative effects. Historic overfishing, fluctuations in marine survival from large scale climatic shifts and in some cases hatchery practices are thought to be other contributors in the reduction of Olympic Peninsula salmon and steelhead populations (McHenry et al. 1996; Hard et al. 2007[2]; Myers et al 1998[3]).

Ironically, despite its reputation as a haven for Pacific salmon, the Olympic Peninsula, like other regions throughout the Pacific Northwest, has suffered dramatic decreases in salmon production during the last century (McHenry et al. 1996). Indeed many populations have either been locally extirpated, are listed as threatened under the Endangered Species Act (ESA), or have declined to remnant levels. For example, Chinook salmon from the Pysht River and

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[2] Hard, J.J., J.M. Myers, M.J. Ford, R.G. Cope, G.R. Pess, R.S. Waples, G.A. Winnans, B.A. Berejikian, F.W. Waknitz, P.B. Adams, P.A. Bisson, D.E. Campton, and R.R. Reisenbichler. 2007. Status review of Puget Sound steelhead (*Oncorhynchus mykiss*). NOAA Technical Memorandum NMFS-NWFSC-81.

[3] Myers, J., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grant, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status review of Chinook salmon from Washington, Idaho, Oregon, and California. NOAA Technical Memorandum NMFS-NWFSC-35.

Morse Creek are locally extirpated (McHenry et al. 1996), while steelhead populations in the Elwha and Dungeness Rivers (Hard et al. 2007) and sockeye salmon from the Ozette (Gustafson 2007[4]) are threatened and federally protected.

Watershed assessment or watershed analysis is a scientific tool used to assess landscape and land-use factors that affect rivers and their watersheds (Beechie et al. 2002[5]). Watershed assessments may utilize various methodologies but ultimately can identify the cause of habitat change or loss as well as identify needed habitat protection and restoration actions. Several watershed analyses have been completed on Olympic Peninsula watersheds. While the results vary somewhat between watersheds, there are themes that are similar and repeat with regards to habitat conditions that affect Pacific salmon on the Olympic Peninsula. These include a suite of common impacts resulting from historic logging practices (which is far and away the most widespread land use effecting *[sic]* Olympic Peninsula watersheds) and other land use activities that include:

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[4] Gustafson, R.G., T.C. Wainwright, G.A. Winans, F.W. Waknitz, L.T. Parker, and R.S. Waples. 2007. Status review of Sockeye salmon from Washington and Oregon. NOAA Technical Memorandum NMFS-NWFSC-33.

[5] Beechie, T. J., G. R. Pess, E. M. Beamer, G. Lucchetti, R. E. Bilby. 2002. Role of watershed assessments in recovery planning for salmon. Pages 194-225 */in/* Montgomery, D. R., S. Bolton, D. B. Booth. (Eds.) Restoration of Puget Sound Rivers. University of Washington Press, Seattle, WA.

- Increases in delivery of fine sediment to stream channels
- Increases in peak flow hydrology delivered to stream channels
- Reductions in woody debris loading delivered to stream channels from riparian forests for maintaining habitat forming processes.
- Loss of access to historically accessible habitats including from the installation of culverts at road crossings that have failed to adequately pass juvenile and/or adult fish at all stages of flow.

Depending upon the results of the individual watershed analysis in question, factors from other contributing land uses have also been identified that have further reduced habitat conditions for Pacific Salmon. These land use impacts are generally detrimental as they act to reduce life stage survival of Pacific salmon by degrading water quality, spawning and rearing habitat. For example, fine sediment is known to reduce the survival of developing salmon eggs during the incubation stage of their life history. When more than one of these factors occurs the effect may be magnified and is in referred to as a cumulative effect.

Human caused barriers, such as those caused by culverts at road crossings, directly affect the productivity of a given watershed's salmon population. Improperly designed, installed or poorly maintained culverts can create physical conditions which may inhibit or prevent the passage of both adult and juvenile salmon. Excessive outfall drops and

excessive water velocities are typical mechanisms that may inhibit or prevent salmon migration to spawning and rearing habitats. Depending upon the location and severity of the blockage, a culvert barrier may completely eliminate access to salmon and cause local extirpation. In less severe cases (partial barriers) certain species or life histories may be excluded from historic spawning and rearing habitats.

Besides limiting access to habitats needed for salmon to complete their life histories, culverts may cause other undesirable impacts for fish and habitat forming processes that support them. Undersized culverts may prevent the natural transport of sediment and large wood necessary to support downstream habitats. During higher flows, culverts can "backwater" at their inlet because of insufficient transport capacity of the culvert itself. When this occurs stream velocity decreases and fluvially transported sediment and wood is typically deposited in the vicinity of the culvert inlet (Figure 1 & 2). This creates a maintenance problem; however the ecological implications to fish may be great. For example, Hammerquist Creek is a Pysht River floodplain tributary that has coho, steelhead and cutthroat trout spawning and rearing habitat. Hammerquist Creek drains through a small concrete culvert on State Highway 112 that is considered passable to fish. However it does not allow significant sediment passage (Figure 33 in Haggerty et al. 2006). Hammerquist Creek and its two associated wetlands provide overwinter habitat for thousands of coho juveniles that originate in other sections of the Pysht watershed. These fish access from the river during fall and winter high flows and exit as smolt in the

spring. During some spring smolt outmigration periods, the creek may completely dry up as the creek disappears (sub-surface) through the large volume of sediments that have accumulated upstream of the culvert. In the 2005, local landowners documented the loss of more than 1000 coho pre- smolts (Figure 34 in Haggerty et al. 2006) and successfully moved another couple of thousand to the river from isolated holes in the creek and the wetlands outlets. In 2005-2006, additional fish losses because of upstream culvert stranding were documented on other Pysht River tributaries (Haggerty et al. 2006). Interestingly culverts are rarely thought of as barriers to downstream migration.

Culverts on roads or stream crossings high in the watershed may also plug and fail catastrophically. They may also route water on over steepened slopes and generate landslides. Regardless, the impacts of these culvert generated catastrophic events are transferred far downstream to habitats occupied by resident and anadromous fish. During my time working on the Olympic Peninsula I have witnessed dozens of such events in the Boundary Creek, East Twin River, Deep Creek, Calawah River, Sol Duc River, Hoh River and Clearwater Rivers.

Two state highways (101/112) directly bisect the Lower Elwha Klallam Tribe's usual and accustomed area and cross numerous streams through both bridges and various drainage structures including culverts and fishways (depending upon location). Topographic conditions on the Olympic Peninsula influenced the location where state highways were constructed. River valleys were often used because construction was relatively simple through low

gradient river valleys. For example, Highway 112 is routed along portions of the mainstem Pysht, Clallam and Hoko Rivers where it encroaches on river, floodplain and riparian habitats and crosses tributaries at multiple locations. These crossings have created barriers for fish to access floodplain tributaries and wetlands that provide a critical overwintering habitat for species such as coho salmon (Figure 35 in Haggerty et al. 2006 & Figure 5). In contrast Highway 101 crosses many watersheds in the lower portions of their watershed, particularly on tributaries to the Strait of Juan de Fuca. On larger streams, bridges have been constructed that generally pass fish, but may cause other ecological problems. These may include interference with fluvial transport of wood and sediment and velocity impacts when bridge openings are undersized. On smaller streams culverts have been historically installed that if impassible may dramatically impact fish production of the entire watershed. Some examples I have personally observed include Chicken Coop (Figure 6), Colville (Figure 7) and Joe Creeks (Figure 8).

Despite the level of historic impacts that have contributed to degradation of stream and riparian habitats on the Olympic Peninsula, I have considerable optimism that these watersheds and their habitats may be recovered using a combined strategy of conservation easements and purchases to protect existing functional habitats, improved land use regulations to prevent further damages, active restoration to recover damaged habitats, and reductions in fishing mortality. The systematic correction of barrier culverts is an important place to focus restoration efforts. It is my professional opinion

that the Olympic Peninsula represents one of the best geographic regions in Washington to recover salmon populations. The number of watersheds that have federally protected lands managed by the National Park Service and US Forest Service ensures that habitat forming processes will be protected across a large area. Much of the remaining areas are state and privately owned lands managed for timber production. Although these lands have historically been intensively harvested with little regard for watershed and ecosystem processes, significant improvements have occurred in the last two decades as forest practice regulations in Washington State improved under the Timber, Fish and Wildlife Agreement (TFW) and Forest and Fish Agreements (FFA). TFW (1987) and FFA (2000) were negotiated between the timber companies, state agencies, Tribes and environmental groups. The Lower Elwha Klallam Tribe is actively involved with several large timber companies to accelerate restoration of watersheds and recovery of salmon populations. Improved forest management combined with active restoration of habitats drives the Tribe's restoration of forested watersheds within its usual and accustomed area.

IV. Overview of LEKT Fisheries Program.

The Lower Elwha Klallam Tribe maintains a natural resources department that includes fisheries, water quality, wildlife management, and forestry responsibilities. The fisheries division is by far the largest program within the natural resources department and includes the following divisions: 1) fisheries and shellfish management, 2) hatchery production, 3) habitat management. Each division is supervised by a biologist and staffed with several

technicians, who reports to the natural resource manager. The natural resources manager receives policy guidance from a fisheries committee composed of tribal members with interests in fishing, however ultimate responsibility for tribal policy decisions regarding fisheries issues lies with the Tribe's business council. Members of the business committee are directly elected by registered members of the Tribe.

Fisheries issues are of great importance to the Tribe as a whole. The Tribe and its ~800 members have struggled economically, and fisheries for salmon, marine fishes and shellfish provide incomes to many families. Subsistence fishing is also practiced by many tribal members. The conservation and restoration of salmon in particular are an important focus of the daily work performed in the Elwha fisheries office. Fisheries management actions are conducted with the long term sustainability and recovery of the salmon resource as a whole in mind. Hatchery supplementation actions are carefully evaluated to allow fishing opportunity while minimizing deleterious interactions with native stocks. Habitat management is conducted with an eye toward protecting existing functional habitats while restoring those degraded by human impacts. Each division in the fisheries department works collaboratively to achieve overall recovery goals by watershed and species. The Tribe also interacts with federal, state and private landowners to achieve restoration goals where possible.

The habitat management division uses watershed assessment and monitoring programs as a scientific tool to assess resource conditions and identify

restoration opportunities and priorities (Beechie et al 2002). Our basic philosophy is to conduct watershed restoration systematically and at the watershed scale. In other words we attempt to treat all human caused problems over a wide an area as possible. Working within the hydrographic boundaries of individual watersheds is a rational way to break down restoration issues into discrete boundaries that coincide with physical and biological function. Watershed scale restoration also has the highest potential for succeeding (Wohl et al. 2005[6]). Restoration conducted at the scale of individual projects or at the individual stream reach may not result in the salmon recovery goals favored by the Tribe. This is not to say that the Tribe does not support or pursue individual projects. While whole watershed restoration is the "gold standard", the reality is that actually implementing the practice is exceedingly difficult and time consuming. In some watersheds a more opportunistic approach may be the only possible way for restoring habitat conditions in the short term.

Within an individual watershed we generally follow the recommendations of Roni et al (2002)[7] for

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[6] Wohl, E., P.L. Angermeier, B. Bledsoe, G.M. Kondolf, L. MacDonnell, D.M. Merritt, M.A. Palmer, N.L. Poff, and D. Tarboton. 2005. River restoration. Water Resources Research 41:1-12.

[7] Roni, P., T.J. Beechie, R.E. Bilby, F.E. Leonetti, M.M. Pollock, and G.R. Pess. 2002. A review of restoration techniques and a hierarchical strategy for prioritizing restoration in Pacific Northwest watersheds. North American Journal of Fisheries Management 22:1-20.

conducting hierarchical watershed restoration. Roni et al. 2002 noted that restoration of Pacific Northwest watershed should focus on the restoration of natural processes that create and maintain habitat as opposed to manipulating instream habitats. As such they recommended an approach that includes the following elements:

- Protect areas of high quality and functional habitat
- Reconnect isolated habitat areas isolated by human caused barriers
- Restore hydrologic, geologic and riparian processes
- Conduct instream habitat enhancement
- Conduct meaningful watershed scale monitoring

These principles are being applied to watershed scale restoration efforts by the Tribe in the following watersheds: Elwha River, Salt Creek, East Twin River, Deep Creek, and Pysht River. The tribe also has active watershed restoration in other watersheds such as Siebert Creek, Ennis Creek, Clallam River and Hoko River. These efforts to date have been more opportunistic and have not scaled up to the watershed scale as yet. Opportunistic restoration may include smaller scale projects with individual landowners in watersheds that lack a completed scientific analysis of watershed conditions.

The Tribe not only identifies restoration opportunities, but procures funding through competitive grants. The Tribe has successfully completed over 40 separate restoration projects with

a combined value exceeding $10 million dollars since 1994. The Tribe employs a full time restoration crew composed of tribal members who implement restoration projects under the direction of the habitat manager. The habitat manager position is supported by federal and state funds received in support of the Forest and Fish Agreement (FFA).

V. LEKT Culvert Related Work.

The Lower Elwha Klallam Tribe has become increasingly involved with the inventory, assessment and correction of culverts within its usual and accustomed area. This has occurred because of the increased knowledge gained of our watersheds through scientific study and analysis. Studies such as those funded by and conducted by the Tribe on Salt Creek (McHenry et al. 2004)[8], state forest lands in the Clallam River (WDNR, Unpublished Data) and the Pysht River (Haggerty et al. 2005)[9] directly identified numerous barriers to historic fish habitats in those watersheds caused by culverts at road crossings. For example, the Salt Creek watershed analysis identified 28 culvert barriers that blocked access to one-half of the historically accessible habitat in the watershed (Figures 27 & 28 in McHenry et al. 2004). Individual site specific assessments at numerous locations have

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[8] McHenry, M., R. McCoy and M. Haggerty 2004. Salt Creek Watershed: Assessment of habitat conditions, fish populations and opportunities for restoration. Lower Elwha Klallam Tribe, Port Angeles, WA.

[9] Haggerty, M., M. McHenry and R. McCoy. 2006. Pysht River floodplain habitat Inventory and assessment. Pacific Salmon Commission, Vancouver, British Columbia, Canada.

further reinforced the need to systematically identify and correct these culvert barriers: they are ubiquitous throughout the tribe's usual and accustomed area. These include assessments conducted by other agencies such as WDFW's efforts to identify and prioritize barriers on state highways (www.wsdot.wa.gov/Environment/Biology/FP/fishpassage.htm).

Collectively these inventories provide useful information that partially describes the level of impacts from barrier culverts within the Tribe's usual and accustomed area (by individual landowner). Because many culverts on other ownerships or in other watershed have never been formally identified and surveyed, the Tribe considers the level of impacts described to date as conservative estimates. Comprehensive culvert inventories have not been completed on all county, city and private ownerships within the Tribe's usual and accustomed area.

The degree of impact that barrier culverts cause to anadromous salmon within an individual watershed is highly variable. On Ennis Creek culverts and a poorly maintained fishway on Highway 101 acts to limit access to well over half the historically accessible drainage area. Indeed the major tributary to Ennis Creek, White Creek, is completely inaccessible due to a blocking, perched culvert on Highway 101 (Figure 9 & 10). An unnamed tributary to the Pacific Ocean is completely blocked at its Highway 101 crossing at mile post 155 (Figure 11). In contrast, on Deep Creek, culvert barriers on Highway 112 and small tributaries limit access to only ~10% of historically accessible drainage area. In general I would characterize the total effects of culverts as variable depending upon

watershed, with the greater impacts being to small watersheds and individual small tributaries. However, in combination with other ecological impacts, culvert effects are a significant negative cumulative effect for Olympic Peninsula salmon.

VI. Methods for Culvert Assessments.

There are multiple options for conducting culvert assessments and arguments can be made for or against various methodologies. In general, there are six basic questions that need to be answered when conducting a comprehensive assessment of barrier culverts. These include: 1) the location of the culvert within a given watershed's stream network, 2) the extent of the barrier (complete vs. partial), 3) the amount and quality of potential habitat affected, 4) the ecological effects of the culvert, 5) the physical characteristics and condition of the culvert, and 6) the presence or absence of fish in relation to potential barrier culverts. To locate stream crossings some surveys use existing maps available in Geographic Information Systems (GIS) to locate the intersection of road and stream networks. The tribe has used this approach to initially locate culverts in the Pysht River floodplain (Haggerty et al. 2005). These GIS based approaches to locating stream crossings at road and stream intersection tend to increase cost efficiencies as maps can be produced quickly in the office. Another approach is to simply walk the stream network until a culvert is encountered. This approach works well in watersheds that have extensive, old and poorly mapped road networks such as may be found in state and private industrial forest lands. However, it requires a large investment in field time by crews thus increasing inventory costs. The Tribe has used this

approach to document culvert barriers in the Clallam River drainage (WDNR Unpublished Data).

A novel method involves the use of LIDAR (Light Detection and Ranging) Imaging, a remote sensing technique that can provide precise digital elevation (grid) models of the earth's surface. The Tribe used LIDAR data for Salt Creek and a combination of LIDAR and ground based GPS investigations on the Pysht River to locate, correct and classify stream layers for use in watershed analysis (McHenry et al. 2004; Haggerty et al. 2005). These techniques resulted in highly accurate maps of the stream habitats available in Salt Creek and the Pysht River floodplain (see Figures 3, 27, 28 in McHenry et al. 2004; Figures 7, 10, 24, 36 in Haggerty et al. 2005). This method resulted in a much greater network of stream habitats than existing hydrologic data layers based on traditional topographic surveys (USGS, WDNR). These maps provide the data upon which digital elevation models (DEMs) are generated. Due to hardware restrictions such as capacity and speed, large areas of coverage typically have reduced resolution. For example, generating and using a DEM of a large area such as the state of Washington, a grid width of 30 meters square is used to create the DEM. This grid resolution is derived from the existing topographic quadrangle which is 1:24,000 scale maps generated in the 1940's from aerial survey methods. In contrast, LIDAR generated maps produce grid cells of 2 m square. The level of accuracy afforded by this new technology has greatly improved remote mapping capabilities.

We compared the LIDAR imagery with existing stream and road data layers and ground surveys to

identify habitats affected by fish passage barriers. Indeed, many of the habitats identified in the Pysht floodplain assessment were not known (not found on existing water type maps) until the LIDAR data was developed for the area. On the Pysht River, several stream/wetland complexes did not exist on existing water type or hydrology maps including: Spruce, Shop, Andis, Piling, 4500, and 4800 creeks. Other tributaries including Cabin, Razz and Lost Creek were either in incorrect positions or underestimated the stream length actually found on the ground. Not only were these habitats not well described, they were frequently blocked by culverts on state and privately owned roads. Culverts were estimated to represent barriers to nearly 53% of the total length of floodplain habitat. Additionally, culverts blocked access to a total of 74.9 acres of wetlands habitats in the Pysht floodplain, a critical habitat type for coho salmon (Haggerty et al. 2006). Based on these experiences I have concluded that because of inaccuracies in base hydrology maps it may be difficult to identify the total extent of the impacts caused by culverts. It is my professional opinion that the majority of culvert inventories that have been conducted to date, including those on state highways and forestlands, are conservative in their assessment of total impacts. These surveys are based only on data in existing hydrology layers, which to date has not been comprehensively corrected by LIDAR analysis or other means. Until the known population of streams, wetlands and other types of aquatic habitats are accurately defined, the likelihood of missing streams and blocking culverts remains high.

To assess effects of culverts on fish and associated habitat forming processes the Tribe has primarily used the WDFW assessment methodology (WDFW 2000[10]). This method provides a relatively rapid and repeatable, technique for assessing physical conditions at individual culvert sites. Parameters analyzed include culvert size (and size in relation to channel size), material, condition, slope, outfall drop, shape, and bottom materials. Additional data collected includes the characteristics of fill, and habitat conditions immediately downstream of the culvert. In my experience the level A analysis has resulted in a determination of the culvert's ability to completely pass fish, partially pass fish, or form a complete blockage to fish passage. In cases where the level A fails to produce a clear outcome in terms of fish passibility, a level B method that involves more detailed survey data collection in combination with hydrology modeling can be applied. Using the WDFW assessment methodology provides a standard methodology so that data can be readily shared between tribes and state agencies. We used the Level A method successfully on both the Pysht and Salt assessments to identify total and partial barriers to fish migration. Level A worked very well for these surveys as the majority of culverts encountered were clearly undersized, perched, lacked natural substrate, or set at excessive slopes. Additionally the majority of the culverts encountered were constructed of concrete

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[10] Washington Department of Fish and Wildlife. 2000. Fish passage barrier and surface water diversion screening assessment and prioritization manual. Salmon Screening, Habitat Enhancement, and Restoration (SSHEAR) section, Olympia.

with smooth bottoms. Smooth concrete culverts may produce flow velocities that exceed sustained swimming speeds generated by juvenile fish. An assessment of this type takes approximately 3 hours per culvert by a two-person crew (excluding driving time) once the culvert is identified. The survey can be conducted by natural resource technicians with specific training using the method, but not necessarily requiring an advanced degree. In order to reduce subjectivity, the interpretation of the data collected and the assignment of culvert passibility should be done by either a biologist or hydraulic engineer (or preferably a team having both areas of expertise).

Once a stream barrier culvert has been located and identified, it is important to characterize the amount and quality of habitat blocked by the culvert in question. Habitat characterization is typically used to assign importance or prioritization to culvert corrections within a wider geographic area (watershed, region, state, province). Ideally all culvert corrections would be implemented over a reasonably short time period. However, budget limitations have traditionally limited comprehensive barrier corrections. As a result, habitat characterization is used to prioritize corrections: the culverts that block the greatest amount of high quality habitat areas are typically corrected first.

Similar to methods for locating culverts, there are multiple methods for assessing the amount of habitat and its quality above a given blocking culvert. The most accurate methods involve a direct survey of habitat by field crews. Under this methodology, crews would physically inventory stream characteristics upstream of barriers using any number of inventory

methods. WDFW (2000) uses a system that measures attributes such as stream gradient, width, habitat type, stream bottom substrate and large woody debris. While this method is desirable in terms of producing highly accurate results of habitat conditions, it is also more expensive requiring the deployment of trained crews at considerable cost. Costs can be reduced by implementing habitat sub-sampling schemes or reducing the number of variables collected.

The Tribe has used both ground based surveys and estimates of habitat above barriers based upon physical models driven by watershed geomorphology. The later involves delineating stream network by dominant geomorphic drivers of habitat condition including gradient and valley confinement. This is a particularly good technique where accurate maps of the stream layers are available as derived from LIDAR. We used this technique in Salt Creek (McHenry et al. 2004) to estimate the length of stream, by gradient and confinement class, above a given blocking culvert. This provides a convenient means of prioritizing restoration treatments and corrections, particularly when budgets limit field survey time.

VII. Barrier Correction Successes.

The rapid responses of salmon when barriers of various types are eliminated are well documented in the fisheries literature. Probably the most spectacular example is from the Fraser River, British Columbia, where Pink and other salmon species were cut off from the majority of the watershed by a landslide in 1913. Following installation of fish passage facilities in 1940, pink salmon quickly re-colonized the upper

watershed and established a large self-sustaining population within 20-30 years (Pess et al. 2007[11]). In recently de-glaciated habitats in Glacier National Park, Alaska, diverse populations of salmonids have established themselves within decades of glacial retreat (Milner and Bailey 1989[12]). In contrast where fish ladders have been installed or culvert barriers removed the response may be much more rapid. On the Cedar River, Washington, installation of a fish ladder on a low head dam allowed naturally migrating fish habitats from *[sic]* they had been excluded for over 100 years. Within 3 years the total density of juvenile salmon tripled in study reaches above the fish ladder as coho and other species colonized historic habitats (Kiffney et al. 2008[13]). Pess et al. (2003) found that culvert barrier removal projects on the Stillaguamish River, Washington opened 19 km of stream habitat for coho, chum, steelhead and cutthroat trout. Over 250 adult coho were observed spawning in the habitats above the former barrier culverts during two

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[11] Pess, G.R., T. Quinn, and K. Kloehn. 2007. The influence of population dynamics and landscape condition on Pacific salmon re-colonization. Proceedings from the International Association of Landscape Ecology World Congress, July 8-12, 2007.

[12] Milner, A.M., and R.G. Bailey. 1989. Salmonid colonization of new streams in Glacier Bay National Park, Alaska. Aquaculture and Fisheries Management 20:179-192.

[13] Kiffney, P.K., G.R. Pess, J.H. Anderson, P. Faulds, K. Burton, and S.C. Riley. 2008. Changes in fish communities following recolonization of the Cedar River, Washington by Pacific salmon after 103 years of local extirpation. River Research and Application.

consecutive spawning seasons after the project (Pess et al. 2003[14]).

Within the Lower Elwha Klallam Tribe's usual and accustomed area, barrier corrections have also resulted in rapid responses by colonizing populations. In Salt Creek, the Tribe in a cooperative project with the Department of Natural Resources (WDNR) removed a series of culvert barriers on an unnamed tributary (19.0010) during the summer of 2006. During the first rains that fall (October) adult coho salmon were observed passing through former barriers and spawning was documented above several of the barriers. I have made similar observations following barrier removal projects on Siebert Creek, where a box culvert and fish way were replaced by a bridge (Old Olympic Highway Crossing) and Susie Creek, a Lyre River tributary, where a culvert was replaced by a bridge (Highway 112 bridge replacement). Monitoring of adult escapement on both systems has indicated a positive increase for steelhead and coho salmon (Unpublished Data, Lower Elwha Klallam Tribe). On a South Fork Pysht River tributary (unnamed), the Tribe improved access to a forested wetland and pond complex above an impassible culvert barrier. Smolt production

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[14] Pess, G. R., T. J. Beechie, J. E. Williams, D. R. Whitall, J. I. Lange, J. R. Klochak. 2003. Chapter 8 - Watershed assessment techniques and the success of aquatic restoration activities. Pages 185-201 in Wissmar, R. C., P. A. Bisson. (Eds.) Strategies for Restoring River Ecosystems: Sources of Variability and Uncertainty in Natural and Managed Systems. American Fisheries Society, Bethesda, Maryland.

monitoring has shown a steady and dramatic increase in the number of coho salmon being produced from this system following restoration (Figure 12; Unpublished Data, Lower Elwha Klallam Tribe).

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Figure 12. Coho smolts produced by year from the E3000 pond complex following correction of culvert barriers by the Lower Elwha Klallam tribe in 2003. Source: Unpublished Data Lower Elwha Klallam Tribe

FISH PASSAGE PROGRAM
DEPARTMENT OF TRANSPORTATION INVENTORY
FINAL REPORT

Prepared for

THE WASHINGTON STATE LEGISLATURE
JUNE 1997

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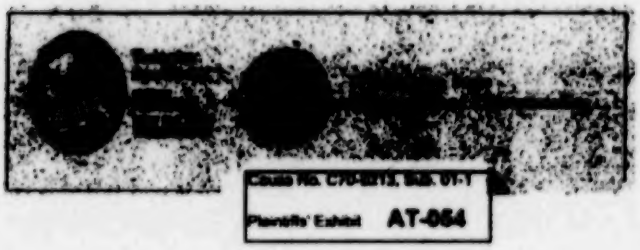
LANDS AND RESTORATION SERVICES PROGRAM

Salmonid Screening, Habitat Enhancement
and Restoration (SSHEAR) Division



[Original Page 1]

EXECUTIVE SUMMARY

It is recognized that wild salmon and trout are a symbol of the waterways of Washington, providing economic benefit to its citizens and indicating the health of streams and rivers. Economic advantages to local communities from salmonids are not abstract considering the dollars that change hands as a result of human interest in recreational and commercial fishing. In addition, vigorous populations of salmonids are important for healthy, functioning ecosystems because of the interdependence of vast numbers of flora and fauna. Many occupants of the aquatic and terrestrial ecosystems depend on salmonids for food. Most emphatically, endangered species including salmonids present imposing arguments to maintain and manage wild species on an integrated basis.

Fish passage at human made barriers such as road culverts is one of the most recurrent and correctable obstacles to healthy salmonid stocks in Washington. In some cases, many miles of quality salmonid spawning and rearing area have been blocked by a barrier culvert. State Laws subsequently recognize the importance of fish passage (Appendix I). These include RCW 75.20.060, titled "Fishways required at dams, obstructions-penalties, remedies for failure"; RCW 77.16.210, "Fishways to be provided and maintained"; RCW 75.20.061 titled "Director may modify inadequate fishways and fish guards"; and RCW 77.12.425, titled "Director may modify inadequate fishways and protective devices." Hence, fish passage at state highway culverts is important and timely and has been addressed by

Washington Department of fish and Wildlife (WDFW), Washington Department of Transportation (WSDOT), and the Washington State Legislature during the bienniums 1991-93, 1993-95, and 1995-97.

Comprehensive management of stream crossings at state highways requires fish passage inventory and barrier correction and is the topic of this report. Inventory of state owned culverts provides appropriate priorities using gains in usable habitat, sets protocol for repair, and provides a basis for budgeting. Long term planning is the cornerstone to successful funding, biological evaluation, design, project construction, and evaluation of results.

The WSDOT/WDFW strategy for inventory and correction of fish passage barriers is as follows:

- Reporting and documentation of state highway road culvert fish passage problems (inventory).
- Verification of significant stream reaches up to and above barrier culverts, quantification and qualification of blocked habitat, and prioritization of barriers for correction based on benefit evaluation (called priority indexing).
- Engineering evaluation and conceptual design.
- Final design and construction of fish passage facilities on high priority barriers (highest priority index) with dedicated barrier correction funding.
- Identification and correction of fish migration barriers concurrent with WSDOT safety and mobility road projects.
- Fish use evaluation.

[Original Page 2]

The WSDOT inventory has been an evolving project confounded by the merger of the former Fisheries and Wildlife departments; numerous adjustments to inventorying, physical surveying, and prioritizing methodologies; and the conversion to new and more effective database software. When the effort began with the former Department of Fisheries only salmon streams were the target of inventory efforts. Since the merger on July 1, 1994, the issue of fish passage has broadened to include anadromous and resident trout. Through investigation and expertise of habitat biologists it has been determined to be of extreme value to allow trout populations the mobility to intermix to maintain heterozygosity. It is equally important to enable trout to access smaller tributary streams and headwater habitats where adult spawning and juvenile rearing occur. In addition, it has been documented trout occupy stream gradients much steeper than those thought to be occupied by salmon. Hence, acceptable stream gradients were increased from 7% to 12%. Many stream sections containing barrier culverts in resident trout waters were subsequently added to the inventory, although most of the sections inventoried early in the process were not redone.

To date, WDFW has completed all of the road culvert segment and has inspected a total of 1,585 fish bearing stream crossings (culverts) on state routes throughout all six WSDOT Districts (see Figure 1). WDFW has identified 509 barrier culverts for further evaluation. Of those, 268 barrier culverts required correction to provide significant fish habitat gains. Sub-sampling resurveys to document omissions and

errors estimated that another 95 barriers would require correction if the most current methodology were applied to the entire state complex.

Surveys, habitat assessments, and downstream verification of fish passage up to identified barriers have been completed on 193 streams. Sixteen of the streams surveyed did not provide a significant amount of habitat gain above the barrier culvert to justify barrier resolution. Another 91 steams were found to have a significant reach of habitat (>200 m downstream and upstream of the barrier), through a threshold determination (TD) habitat assessment, to justify barrier resolution. A total potential spawning and rearing area of 1,619,839 m^2 (249 linear miles) is currently blocked by WSDOT culverts on the 177 surveyed streams requiring barrier resolution; this is enough wetted stream area to produce 200,000 adult salmonid annually. These estimates would all increase when considering the additional 186 barriers that did not have full habitat assessments.

Working together, WDFW and WSDOT have resolved 17 barrier culverts since 1991 using WSDOT dedicated funding, and another 23 resolved through safety and mobility projects. Total habitat gained for the dedicated projects alone was 216,000 m^2, or roughly enough stream area to produce 27,000 salmon annually, not including the numerous other salmonids that have benefited from these gains. Planning is underway for resolution of at least seven more barriers during the 1997-99 biennium using dedicated funds, and to resolve all barriers in the next two to three decades. Meeting this objective will require the majority of projects to be evaluated concurrent with safety and mobility road projects and

the remainder corrected as independent fish passage projects. Estimated cost is about $40 million, with resultant benefits exceeding $160 million.

[Original Page 3]

BACKGROUND

Alarming declines in salmonids in Washington during the 1980's and 1990's have caused extreme concern among fish managers, commercial and sport fishing interests, environmentalists, Native Americans, and legislatures. Overfishing, hydropower development, habitat degradation, and oceanic events such as El Niño are most often referred to as the causes. One habitat-related cause for weakening of salmonid production which can be easily resolved is human-made barriers to fish migrations caused by improper placement of road culverts. Increasing numbers of roads and resulting culverts are a common product of a growing human population in Washington. Culverts often pose immediate or eventual migration barriers to fish due to design which does not allow passage, or design that fails to consider the hydrology of watersheds, resulting in a culvert placement that eventually becomes a barrier. Changes in hydrology of streams can be natural or can result from watershed-related activities such as logging, road construction, paving, or fires. These factors can cause a passable culvert to become a barrier once stream bed scour from changes in hydrology occurs below the culvert.

A common misconception is that only adult salmon are affected by culvert barriers, as they return from the ocean to native rivers and streams to spawn. Life history studies on salmonids reveal culverts can also limit adult resident trout production and juvenile

salmonid production by blocking them from important rearing areas such as swamps, ponds, marshes, or small streams. These areas have great significance to salmonid production. Research documents the upstream movement of young salmonids into areas such as this, especially during the colder months. Young salmonids do not have the swimming power of adults and are easily blocked from these areas by improperly installed culverts. Another misconception is that streams which dry in the summer have no value to salmonids; this is also not the case. Chum, pink, and sockeye salmon use these areas for spawning, and juvenile coho and chinook salmon for rearing during the high flow months.

This report documents agreements and subsequent efforts to inventory and correct fish passage problems at Washington State highway culverts. It examines Washington Department of Transportation and Washington Department of fish and Wildlife activities pursuant of inventory and correction of fish passage barriers for the bienniums 1991-93, 1993-95, and 1995-97 and provides a prioritized list for future work. It is an update to the Fish Passage Program Progress Performance Reports for the bienniums 1991-93, and 1993-95 (Burns - et. al., 1992, Bates - et. al. 1995). Many methodologies for this inventory were developed in previous bienniums, discussed in the last reports, and will be referred to in this document. In some cases revisions to the original methodology occurred this biennium and are discussed herein.

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length of usable stream above the culvert, surveys divide the stream into habitat types: pools, riffles,

rapids and ponds. This is done by sampling 30-meter sections every 161 meters (one-tenth mile) or a 60-meter sample every 322 meters in streams estimated to be greater than one mile in length. Within sample areas, habitat types (riffle, pool, rapid and pond) are delineated and measured. streambed substrate composition (percentage of boulder, rubble, gravel and sand) within each type is estimated, and the stream gradient is measured. The samples result in an estimated ratio of habitat types which is then applied to the total stream length to obtain total riffle, pool, rapid and pond areas. These areas are then used to calculate spawning and rearing areas (see below). Any artificial barriers to salmonid passage are also documented. Appendix VIII contains a detailed description of the current physical habitat survey methodology.

For survey methods (1, 2, and 3) used between January 1992 and July 1995, a stream gradient > 7% continuing for 160 m or more was considered to be a gradient barrier. After July 1995 (method 4), this was increased to a gradient > 12% which continues for more 160 m. Since the end point of a physical survey may be controlled by a gradient barrier, then sampling to a higher gradient will result in more habitat being measured.

Physical habitat survey data are used to estimate habitat gains in terms of fish production potential. Habitat gain is expressed in square meters (m^2) of either spawning or rearing habitat. These values are key variables in the PI. Spawning area is used for those species (chum, pink, and sockeye salmon) whose production is limited by spawning habitat. Rearing area is used for those species (coho and chinook

salmon, steelhead, cutthroat, rainbow, bull, brook, and brown trout) whose production is limited by rearing habitat. Physical survey data were processed in a customized spreadsheet which generated a detailed summary report (Appendix X). The report documents the total habitat gain per species, habitat measurements for each reach and the total survey, information describing the quality of the stream habitat, and basic information on the survey.

In the original survey format (method 1), spawning area was defined as total riffle area. However, since spawning occurs mainly in late fall/early winter, when flows are at or near Ordinary High Water (OHW), and habitat types other than riffles may be used for spawning, so this method can result in an underestimation of spawning area. The revised physical survey methods (2, 3, and 4) define spawning area as the sum of the areas of each habitat type at OHW, multiplied by the habitat type's gravel percentage. The OHW line is defined as the point where "the presence and action of waters are so common and usual and so long continued in ordinary years, as to mark upon the soil or vegetation a character distinct from that of the abutting upland" (WAC 220-110-020, 1994). Widths at OHW are determined during the survey using the bank vegetation line, and other hydrologic evidence.

Since some salmonids remain in smaller tributaries year-round, their production is limited by the amount of rearing habitat available during the lowest stream flows of the year. Physical surveys are conducted throughout the year so measurements may not reflect low flow conditions. Calculating rearing habitat based on measured wetted area (methods 1 and 2) may

overestimate available rearing habitat. Methods three and four incorporate the 60 day low flow methodology for calculating rearing habitat. Sixty-day low flow is defined as the lowest average flow occurring over any period of 60 consecutive days during the year, and is calculated for each stream using a regional constant formulated

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WSDOT ROAD PROJECTS AND BARRIER REMOVAL PLANNING

During the 1993-95 biennium, it was recognized that long-term planning between WSDOT and WDFW should include not only funding for dedicated, independent fish passage projects, but also

- close communication and coordination between the two agencies
- identification and correction of barriers in conjunction with road work, and
- long-term commitment by the legislature

Since the WSDOT inventory began, WDFW has developed a system to document highway barrier culverts statewide in order to recommend a prioritized list of fish passage projects to be completed using dedicated funding. However, with ongoing WSDOT road construction projects, it was recognized a more efficient use of state funding would be to repair fish passage problems in conjunction with WSDOT mobility, preservation/ improvement, flood control projects, as well as other jobs WSDOT might undertake which would lead to mobilization of heavy equipment in the vicinity of fish barriers. Given the number of barriers identified by the Phase I

inventory, it was estimated it would take over 100 years to reach complete barrier resolution using dedicated funding only. The repair of culverts in conjunction with road projects, however, could allow complete barrier resolution in two to three decades. This approach would lead to a decrease in project costs by reducing the expense of mobilizing equipment, and a more timely increase in fish production and harvest opportunity which would enhance project benefits.

WSDOT has agreed to notify WDFW about upcoming road construction projects. If this notification occurs before the construction plans are engineered, a field crew will re-inventory all stream crossings located within the highway miles of the road project. Since WDFW and WSDOT have agreed on this approach, the inventory team has received numerous calls from WSDOT requesting comments on fish passage needs at road projects. WDFW has evaluated road projects on the following state routes; 4, 14, 18, 20, 97, 101,142, 164, 401, 504, 522, 530, 542, and 706.

All stream crossings are documented and every WSDOT culvert is evaluated for fish passage before a road project is engineered. A threshold determination (TD) is conducted upstream and downstream of each barrier culvert. Threshold determinations are conducted to verify a significant reach ($\geq$ 200 m) of fish habitat available upstream and downstream of the barrier culvert, in order to meet the threshold criteria for barrier resolution. The TD evaluation requires a surveyor to walk (measuring the distance with a metric belt chain) a minimum of 200 m upstream and downstream of the culvert and document habitat quality. The stream gradient is measured every 50 m, species observations are made, human-made and

natural barriers are documented, and habitat quality is noted. A WDFW TD form (Appendix XII) is used when collecting this data.

If a barrier culvert within the road project meets the threshold criteria (has a significant : ach of habitat upstream and downstream), then it will be recommended for barrier correction, or culvert replacement, to be completed during the road project. Sometimes an undersized or failing culvert may be recommended for replacement for easier maintenance. Table III lists the barrier culverts that were or are planned to be replaced or corrected through road project recommendations. Barrier culverts WDFW

BRIEFING DOCUMENT
FISH PASSAGE
A KEY TO FISH HEALTH
4/8/97

WHY HAVE FISH PASSAGE?

1. Limited fish access to stream, lake, and river habitats because of poor road culvert construction, filling, diking, irrigation systems, and dams causes significant impacts to fish populations. Fish need habitat but if they cannot reach spawning and rearing areas, then the full potential of the habitat is not achieved and depressed and even healthy fish stocks decline to levels that cannot support utilization objectives and even to levels of extinction.

2. State law requires fish passage. At least as early as 1881, fish passage was recognized as a need in Washington and expressed in the Code of Washington. The most recent legal requirements are embodied in RCW 75.20.060 and 77.16.210.

3. Road crossings are a particularly insidious deterrent to fish passage because the average observer views water running through a culvert as an effective passage medium. In fact, road crossings block about 3,000 miles of spawning and rearing areas in Washington. This results from about 25% of the road culverts that are in noncompliance with fish passage statutes. Even when these culverts are provided with fish passage structures, there is about 25% noncompliance for maintenance needed to ensure effective passage. For facilities other than road culverts, the picture is not as clear, but based on

eastern Washington estimates noncompliance is expected to exceed 10%.

4. It is difficult to find categories of facility owners that do not share some responsibility for fish passage problems. For example, roughly about 10% of barrier culverts involve state roads, 40% county/municipal roads, and the remainder federal and private roads.

HOW HAS FISH PASSAGE BEEN ADDRESSED?

1. In the 1980's, WDFW created a fish passage unit that

a) maintains databases on fishways and barriers,

b) inventories road culvert barriers and associated habitat,

c) regularly inspects fishways and sends maintenance notices to owners,

d) serves as a core of technical fish passage experts,

e) conducts workshops, and

f) conducts specialized, high-risk construction projects to fix barriers using mobile, interdisciplinary teams of biologists, construction personnel, and environmental engineers. This complements the efforts of volunteers and Regional Enhancement Groups that concentrate on lower risk projects.

2. In the 1990's, WDFW emphasized partnerships with jurisdictions to promote fish passage in a cost-efficient manner.

a) WDFW and the Washington State Department of Transportation (DOT) entered three interagency agreements in the 1990's that involve barrier inventory work and barrier correction on state roads using dedicated fish passage funds. WDFW constructs many of the projects pursuant to reimbursable contracts. To accelerate the process, DOT also accommodates fish passage concurrent with safety and mobility road work using road funds. This approach became apparent when it was estimated that it would take more than 100 years to correct all barriers at state highway culverts with independent fish passage projects alone. Alternatively, a carefully designed blend of this effort with fish passage work on mobility and safety road projects could significantly reduce this time span. This improves cost efficiency because mobilization and some work efforts at the culvert sites would not have to be duplicated and because benefits of restored fish production would not be delayed nearly as long. In fact, it has been estimated that every dollar spent on fish passage work will return a minimum of four dollars in fish

benefits, even when not considering non-consumptive values. It is expected that the prioritization of all state road barriers will be completed by the end of the 1995-7 biennium and that barriers on DOT roads can be corrected within two to three decades.

b) There is a recent global MOU with the Washington State associations of Counties and Cities and other state agencies that sets the framework for cooperative arrangements between WDFW and individual counties and cities.

c) The WDFW/DOT approach has been extended to a limited number of individual counties and, to a lesser extent, cities. In exchange for WDFW conducting the inventory of barrier culverts on county roads, the county is expected to provide at least half the funds for cooperative barrier resolution projects that WDFW builds. These arrangements are not intended to be open-ended, but rather as a "jump-start" to allow cities and counties opportunity to learn how to address fish passage and to budget for future barrier correction. The intent is for these authorities to independently correct barriers after working with WDFW on several projects. This program is in varying stages of completion with Kitsap, Skagit, and Thurston counties. Jefferson County has

agreed to this arrangement beginning the 1997-9 biennium, although funding is not yet secured for even the inventory phase. Snohomish, King, Clallam, and Pierce counties and the cities of Olympia and Tumwater have also made sincere efforts at addressing fish passage.

WHAT'S IN THE FUTURE?

1. There is a need to accelerate fish passage on county and city roads, which are estimated to include about 1000 barriers. If the WDFW/DOT model is followed, it is estimated that road culvert inventories and habitat assessments to prioritize barriers for order of correction will cost about $8 million spread over two to three decades. If barrier correction incorporates a blend of dedicated fish passage projects (e.g., 200) and projects in conjunction with road work (e.g., 800), then correction of all barriers would cost about $100 million, again spread over two to three decades. This time period coincides with that for correction of barriers on DOT roads and includes cost efficiencies derived from interagency cooperation and integration of fish passage with road work.

2. There is a need to promote fish passage through the direct, personal involvement of people that work and live within watersheds. This is particularly important for barriers on private lands which are not addressed in the aforementioned jurisdictional approach and that are typically of lower risk than jurisdictional road crossings. WDFW enlists volunteers and coordinates the efforts of Regional Enhancement Groups in

programs that involve hands-on salmonid restoration efforts. For fish passage efforts, this involves Volunteer Technical Specialists and environmental engineers in WDFW well versed on fish barrier inventory, prioritization and correction. These specialists can, in turn, train and develop this effort within the volunteers and Regional Enhancement Groups. This approach is designed to accelerate fish passage efforts through a network of local partnerships and a well-informed, active constituency operating on a watershed approach that interfaces well with the jurisdictional approach.

Table 1a. 315 Base Culverts with partial, total, and unknown barriers downstream.

	Zero Downstream Barriers	*One Downstream Barrier*	*Two Downstream Barriers*	*More than Two Downstream Barriers*	*Total*
Base Culverts	178	86	29	22	315
Percentage of Base Culverts	56.51%	27.30%	9.21%	6.98%	100.00%
Downstream Barriers Associated with Base Culverts	0	86	58	94	238
Percentage of Downstream Culverts	0.00%	36.13%	24.37%	39.50%	100.00%

Table 1a classifies the 315 state owned culverted barrier sites that Brian Benson has identified in rebuttal to Tyson Waldo by their number of associated downstream barriers. Four classes are used: zero downstream barriers, one downstream barrier, two downstream barriers, and more than two downstream barriers. The purpose is to show that the 315 state owned culverted barrier sites are impacted by downstream culverts to varying degrees. Of the 220 downstream barriers, 14 are downstream of more than one state owned culvert, and as a result there are 238 instances where the 220 downstream barriers are impacting the 315 state owned culverted barrier sites.

Cause No. C70-9213, Sub. 01-1

Plaintiffs' Exhibit **AT-285**

Table 2a. 315 Base Culverts with partial, total, and unknown barriers upstream.

	Zero Upstream Barrier	*One Upstream Barrier*	*Two Upstream Barriers*	*More than Two Upstream Barriers*	*All Upstream Barriers*
Base Culverts	120	63	31	101	315
Percentage of Base Culverts	38.10%	20.00%	9.84%	32.06%	100.00%
Upstream Barriers Associated with Base Culverts	0	63	62	1245	1370
Percentage of Upstream Barriers	0.00%	4.60%	4.53%	90.88%	100.00%

Cause No. C70-9213, Sub. 01-1

Plaintiffs' Exhibit **AT-288**

JOINT STATEMENT

REGARDING THE BIOLOGY, STATUS, MANAGEMENT, AND HARVEST OF THE SALMON AND STEELHEAD RESOURCES

OF THE PUGET SOUND AND OLYMPIC PENINSULAR DRAINAGE AREAS OF WESTERN WASHINGTON

Prepared for Use In

UNITED STATES, et al vs. STATE OF WASHINGTON, et al

CIVIL NO. 9213

UNITED STATES DISTRICT COURT WESTERN DISTRICT OF WASHINGTON

Prepared by

Washington Department of Fisheries

U. S. Fish and Wildlife Service

Washington Department of Game

May 14, 1973

JOINT STATEMENT

This Joint Statement has been prepared by and under the direct supervision of, and has been reviewed by, each of the undersigned. Except as may otherwise be stated in said Statement the facts, opinions and conclusions set forth herein are those to which each of us would testify as an expert witness in the case for which the Joint Statement has been prepared.

s/J E Lasater
J. E. Lasater, Assistant Director
Washington Department of Fisheries

s/James L Heckman
James L. Heckman, Manager
Northwest Fisheries Program
Bureau of Sport Fisheries & Wildlife
Fish and Wildlife Service

s/Cliff Millenbach
Clifford J. Millenbach
Chief, Fisheries Management
Washington Department of Game

May 14, 1973
Date

PREFACE

This report has been prepared for the purpose of presenting certain basic fisheries information for use in *U. S. v. Washington*, Civil No. 9213, U. S. District Court, Western District of Washington. That action is concerned with the treaty-secured fishing rights of certain Indians. The case is limited to the consideration of those rights as they apply in off-reservation waters of Western Washington exclusive of the Columbia River drainage area and in adjacent offshore waters. The case is concerned primarily with the rights of the Tribes which are parties to that case as they apply to the taking of salmon and steelhead at those Tribes' usual and accustomed fishing places within the aforementioned area (see map p. ii).

Accordingly, this report is limited to a discussion of the salmon and steelhead resources within the U. S. portion of the Puget Sound watershed, the watersheds of the Olympic Peninsula north of the Grays Harbor watershed and the offshore water adjacent to those areas (including those fish which are within any of such waters but are native to outside areas). As used in this report (except where the context clearly indicates otherwise) the term "Puget Sound" includes the Strait of Juan de Fuca and all saltwater areas inland therefrom, and all terms and discussions which would otherwise have a broader or more general scope - such as "fishery resource," "anadromous fish," "salmonids," "total catch," "hatcheries," "freshwater areas," etc. - are to be construed as being limited to the aforementioned geographical area and species to which this report is confined. Other terms commonly

used in reference to Pacific salmon and steelhead are defined in the glossary.

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Glossary of Terms

1. Anadromous fish - Species that are hatched in freshwater, mature in saltwater, and return to freshwater to spawn.
2. Brood year - The year during which a particular year class of fish was spawned.
3. Commercial fisheries - Those fisheries engaged in for the purpose of selling the product.
4. Competitive fisheries - Fishing operations where two or more specific gear types (e.g., sport and commercial) or two or more distinct categories of fishermen compete in the harvest of the same stock of fish or shellfish or compete physically on the same fishing grounds. Fishing by one or more types of gear which interferes with the success of the other(s).
5. Cycle - The life span of a fish from its incubation through its act of spawning.

[6]. Environment - The total of all external factors that affect fish. Not to be confused with *habitat*, which refers to the place where a fish is found.

7. Escapement - See spawning escapement
8. Fishery - The resource, its location, and the act of harvesting.
9. Food fish - Those species of fish designated by the Washington Legislature which may be taken from public waters for commercial sale.
10. Game fish - Those species of fish designated by the Washington Legislature which may be taken from public waters solely for personal use or recreational purposes.

11. Gear efficiency - Comparative capability of various types of fishing gear to harvest a specific stock of fish.

12. Habitat - Area which supplies oxygen, food, shelter, and space necessary for a fish's existence.

13. Harvest - The taking and possession of fish by man. Also used to designate the quantity so taken.

14. Harvestable supply - The number of fish which can be harvested from a definable population without impairing the long-run supply.

15. Indian fisheries - Those fisheries that are engaged in by Indians under claim of right arising from their status as Indians.

16. Jacks - Precocious salmon or steelhead, predominantly males, which have matured one or more years prior to the norm.

17. Landings - The quantity of fish harvested at a particular place at a particular time. When used without qualification it refers to commercial landings.

18. Limited entry - A means of controlling the level of fisherman participation in a definable fishery.

19. Management - Application of programs to maintain, enhance, and harvest fish stocks.

20. Marine - Saltwater areas, i.e., oceans or sounds - not freshwater.

21. Mature stocks - Fish of spawning age.

22. Migration - The seasonal mass movement (often annual) of fish from one place to another,

such as from freshwater to saltwater, or upstream to spawn.

23. Milling - Delay or random movement of fish, most commonly exhibited in estuary areas prior to migrating into streams to spawn.

24. Out-migrants - Young of a specific brood year moving seaward (from freshwater or estuaries) to take up marine water residence.

25. Overharvest (overfishing) - Taking of such quantities from a definable population of fish so that it is no longer capable of reproducing at its optimum rate.

26. Race - An identifiable group of fish of a given species, with unique life history or behavioral characteristics which include time of river entry as adults or distinct time and place of spawning.

27. Recruitment - Addition of new fish to fishable population by growth from among smaller size categories.

28. Run - Most often referred to as the total number of fish in a population enroute to its stream of origin.

29. Salmon and steelhead age classes -

Fry - Newly hatched fish up to a month of age

Fingerlings - Fry remaining in freshwater up to the age of one year from the time they are spawned

Yearlings - Fingerlings entering their second year of freshwater residence up to the start of their seaward migration

Smolts - Fingerlings or yearlings on their seaward migration

30. Salmon preserve - Areas in Washington principally closed to commercial salmon fishing. Personal use hook and line fishing is allowed.

31. Salmon species - (Note: Some earlier statutory definitions included steelhead within this term. Taxonomically, it is a member of the trout family.)

Chinook - Also called spring, king, tyee, or blackmouth (Oncorhynchus tshawytscha)

Coho - Also called silver, silverside, or hooknose (Oncorhynchus kisutch)

Pink - Also called humpback or humpy (Oncorhynchus gorbuscha)

Chum - Also called dog or keta (Oncorhynchus keta)

Sockeye - Also called red or blueback (Oncorhynchus nerka)

32. Seed stock - The spawning adult fish which will produce the next generation or cycle. Usually refers to a specific number of adults needed to produce the maximum number of progeny and returning adults several years later.

33. Spawning escapement - Number of anadromous fish that return from the ocean to freshwater streams and spawn.

34. Sport fisheries - Fisheries which are managed or engaged in for recreational purposes or

personal use, the catch of which cannot lawfully be sold.

35. Steelhead - Salmo gairdnerii, anadromous rainbow trout.

36. Stocks - All or part of a fish population distinguished by place of origin, which may vary from a river tributary to a larger geographic area (river, state, country, hemisphere, etc.).

37. Surplus - The number of fish from a definable population escaping the fisheries and that are in excess of reproductive needs.

38. Underharvest (underfishing) - Harvesting fish below the level that would sustain reproduction of a fish population at its optimum rate.

I. THE FISHERY RESOURCE

§ 1 The Fishery Resource

§ 1.1 General Life History of Washington Salmon and Steelhead

1.1.0 Life History Characteristics Common to Salmon and Steelhead

In the fish family Salmonidae two genera, Salmo and Oncorhynchus, include species of particular importance to the Pacific Northwest. Among the various species of the genus Salmo the rainbow trout (Salmo gairdnerii) has an anadromous variety called steelhead. The genus Oncorhynchus includes all of the species of salmon. Those native to North America are:

1. Oncorhynchus tschawytscha - chinook, also called spring, king, tyee, or blackmouth salmon
2. Oncorhynchus kisutch - coho, also called silver salmon
3. Oncorhynchus gorbuscha - pink, also called humpback salmon
4. Oncorhynchus keta - chum, also called dog salmon
5. Oncorhynchus nerka - sockeye, also called red or blueback salmon

These five salmon species and steelhead are native to Washington State waters. Salmon and steelhead are anadromous fish; that is, they spend most of their lives in saltwater but, when approaching maturity, return to freshwater to spawn (Table 1). They generally return to spawn in the stream in

which they were reared naturally or released after being reared in an artificial environment. On reaching the freshwater spawning area, the female excavates a nest or "redd." She then lays a portion of her eggs which are fertilized by the accompanying male. The female then moves slightly upstream and begins excavating another depression. This gravel movement causes the first eggs deposited to be covered. The process is continued until all eggs are deposited and covered. It is important to note that the redd is dug in the stream (riffle area) where there is good inter-gravel movement of water to supply the eggs with oxygen and to carry away waste material during the incubation period. Once the spawning act is completed, all species of salmon die. This is in contrast to steelhead, which may survive the rigors of spawning.

Salmon and steelhead eggs develop and hatch while within the redd. When first hatched they are known as yolk-fry and remain in the gravel until the yolk material is totally absorbed. Egg incubation, hatching, and larval development require from 90 to 150 days, depending on water temperatures. Free-swimming fry emerge from the gravel in early spring. Juvenile salmon and steelhead spend various lengths of time in freshwater (see following sections on general life histories), then migrate downstream to saltwater. In the marine environment they feed heavily, exhibiting rapid growth until they return to freshwater on their spawning migration. Feeding activity of salmon generally ceases or diminishes as they near or enter their natal stream during the spawning migration. In contrast, steelhead do not cease their feeding activity. Degree of maturity at

commencement of spawning migration varies among and within species, some having viable gonads on entry into freshwater, others after several months of freshwater residence (Tables 1-17 for general life histories and timing of freshwater life phases).

1.1.1 General Life History of Chinook Salmon

There are three important races of chinook salmon, Oncorhynchus tschawytscha, native to Washington State. These are the spring, summer, and fall chinook. This nomenclature is based upon their time of re-entry into freshwater. There are some distinct differences in the life history of these races, including the length of time the adults spend in freshwater during their spawning migration, the time of year when spawning occurs, the area in which spawning occurs, and the length of time juveniles spend in freshwater (Table 1).

Spring chinook tend to have the longest freshwater residency, both as adults and juveniles. As the name implies, they enter freshwater in the spring and yet do not spawn until August or September. They tend to migrate a longer distance in freshwater than the fall fish and utilize the spawning areas farthest upstream. Spring chinook juveniles tend to leave the freshwater habitat and migrate into the marine environment during their second year of freshwater residency as opposed to the fall chinook juvenile outmigration which occurs during the first year of freshwater residency.

Chinook salmon spawn principally in the mainstream areas of rivers and their larger tributaries. Spring chinook adults spend from 3 to 6 months in freshwater and spawn during late summer

or early fall. The mature fall chinook adults spend up to 30 to 60 days in freshwater and spawn in the fall and early winter months. The adult freshwater residence of the summer chinook varies between these two extremes.

The juveniles of these races spend from 2 months to 1 year in freshwater before beginning their seaward migration, the spring chinook delaying the greatest length of time. The seaward migration during spring and early summer takes from 30 to 120 days.

Little is known about the life history of the summer chinook other than they enter freshwater during the summer months as adults and spawn in areas somewhat separate from spring and fall chinook.

Individuals of this species spend from 1 to 5 years in saltwater, with the average being 3 years. The maturing adults most commonly return to spawn during their fourth year. The annual average weight of chinook in the Puget Sound net fishery varies between 18 and 25 pounds.

1.1.2 General Life History of Coho Salmon

Coho salmon, Oncorhynchus kisutch, spawn in numerous small coastal streams and in the smaller tributaries of the larger rivers. The mature adults enter freshwater principally during September-November spend 30 to 60 days in freshwater, and spawn in the late fall and early winter. Juvenile coho salmon quite consistently spend a year in freshwater and will begin seaward migration during their second spring and summer of life. The seaward migration takes 30 to 120 days during the spring and summer

months. The juveniles usually spend two summers and one winter in the marine environment, feeding and maturing to return as adults to spawn during their third year of life (Table 1). The annual average weight of coho in the Puget Sound net fishery varies between 8 and 10 pounds.

1.1.3 General Life History of Pink Salmon

Pink salmon, Oncorhynchus gorbuscha, have a rigid 2-year life cycle. Washington streams have populations of spawning adults in odd years only. The mature adults enter freshwater principally during August and September, spend 30 to 60 days in freshwater, and spawn during the early fall. Spawning occurs generally in the lower portion of the drainages and, in some instances, takes place in stream mouth areas where varying degrees of salinity are experienced. The fry begin their downstream migration immediately upon emergence from the gravel and may spend from 3 to 4 months in marine shoreline areas. The mature adults return on odd-numbered years to the original spawning grounds, always during their second year of life (Table 1). The annual average weight of pink salmon in the Puget Sound net fishery varies between 5 and 6 pounds.

1.1.4 General Life History of Chum Salmon

Adult chum salmon, Oncorhynchus keta, spend less than 30 days in freshwater on their spawning migration. Coastal and Puget Sound rivers receive spawning runs of chum salmon from September generally through December, though fish enter some streams such as the Nisqually River as late as March. As in the case of pink salmon, chum salmon frequently spawn in the lower reaches of the river system and

near tidal areas. This species has been observed to spawn in tidal areas remote from any obvious surface freshwater streams. The fry begin their migration to saltwater immediately after emergence from the gravel. The juveniles may spend 3 to 4 months in shoreline areas in the saltwater. The adults spend 3 to 5 years in the ocean and return to spawn, normally during their third or fourth year of life (Table 1). The annual average weight of chum salmon in the Puget Sound net fishery varies between 10 and 12 pounds.

1.1.5 General Life History of Sockeye Salmon

Sockeye salmon, Oncorhynchus nerka, with few exceptions, enter rivers fed by lakes and usually spawn in tributary streams of those lakes but may spawn below the lakes in the outlet river. They also spawn on gravel beaches where subsurface upwelling occurs within the lakes. The adult spawning migration occurs during the summer and early fall months. One outstanding exception to this timing occurs in the Quinault River. These sockeye enter freshwater from January through July, with the peak of the run occurring during the last of May and the first of June.

The adult sockeye reside in the lake or stream until spawning occurs from September through December. On hatching in the following spring, the young enter the lakes where they spend usually one, frequently two, and occasionally three years feeding upon minute invertebrates. The seaward migration from the lakes usually occurs between March and May. Sockeye reside in the marine environment from 2 to 4 years. Mature fish return to spawn during their third to sixth year of life, but the fourth year is the

predominant age class (Table 1). The annual average weight of sockeye salmon in the Puget Sound net fishery varies between 5 and 7 pounds.

1.1.6 General Life History of Steelhead Trout

Steel head trout, Salmo gairdnerii, may enter the larger river systems of Western Washington during all months of the year. Two "races" of steelhead occur in Washington. Winter-run fish are found in almost all streams west of the Cascade Mountains which empty into saltwater. Summer-run fish occur in the Columbia River and its tributaries above Bonneville Dam and in about 20 percent of the major steelhead streams of Western Washington. Winter-runs move upstream from November to June and spawn in the early spring. Summer-run fish generally travel upstream during June, July, August, and September, but may be found as early as February in some streams. Summer runs lay over in deep pools until the following spring, at which time they too spawn. The spawning season for steelhead extends from February through June, usually peaking in March and April.

The eggs hatch and the fry emerge after 50 to 110 days in the gravel. Juvenile steel head normally spend 2 years in freshwater before migrating to sea. Seaward migration occurs principally from April through mid-May. The adults spend from 1 to 3 years in saltwater before returning to spawn for the first time, usually at the age of 4 years (Table 1).

The frequency of survival beyond the first spawning is low and is a function of energy expended in freshwater migration, as well as number of spawnings. Because of the extremely low survival,

repeat spawners are considered of only minor significance in management of the species. Just as in salmon hatchery egg taking operations, the adult winter steelhead are usually sacrificed. Except for a rare encounter of 8 and 9-year old fish, steelhead do not exceed the age of 7 years. The annual average weight of steelhead in the Puget Sound area sport fishery varies between 8 and 10 pounds.

1.1.7 Timing of Freshwater Life Phases - Salmon and Steelhead

The freshwater adult activity and juvenile development timing has been determined for the five salmon species and steelhead. The precise timing of upstream migration is influenced by a variety of factors, including maturity, water flow, and temperature. These timing data are shown by major river basins in Tables 2 through 17.

§ 1.2 Freshwater Habitat Areas

1.2.0 General Effects of Man's Activities

Early explorers' observations confirm that salmon and steelhead at one time used all streams open to them in the Pacific Northwest. They were the mainstay of a large population of Indians inhabiting the area. Due to man's activities, subsequent to the settlement of the area by non-Indians, and to other environmental changes, sections of streams or entire streams have been removed from salmon and steelhead production. However, all of the principal drainages of the Puget Sound and coastal areas are still utilized to some extent by spawning populations of salmon and steelhead. These drainages are shown in Figures 1 through 5.

1.2.1 Categories of Freshwater Habitat

In the Puget Sound area the types of fish production habitat vary a great deal. The types of production habitat are generally categorized into (1) the major rivers, (2) tributaries to the major rivers, and (3) the smaller independent streams running directly into saltwater. A further breakdown in stream classification separates each of the three basic categories into mountain, middle valley-lower valley, and lowland stream areas. Each offers somewhat different environmental conditions to which the individual species of salmon and steelhead have successfully adapted.

1.2.2 Major Rivers

Most of the major streams entering saltwater originate in mountain glacier fields, as do some of their larger tributaries. They provide a relatively stable water supply year-round from the snow packs, and periodic rainfall. As they move seaward, different types of aquatic environment are presented, ranging from cold, swift-flowing, high elevation streams, to the warmer, meandering lowland valley rivers. Spawning and rearing conditions vary considerably within these larger streams. Their upper reaches are generally characterized by having stream bottoms with large rocks and boulders, relatively short riffles and/or patch gravel spawning areas, and numerous shallow to moderately deep pools. Stream side cover usually consists of dense stands of timber. Basic productivity is usually lower than in the streams below due primarily to the lower water temperature and the fact that less nutrients are contained in the water. Fish utilization in the upper reaches of these major

streams is governed primarily by stream size and accessibility. These sections receive mainly chinook salmon. However, many are also utilized by good numbers of coho and a few pink salmon.

The middle and lower valley areas offer numerous long and broad riffles, many channel split gravel bars, and extensive spawning habitat. Bottom material is generally smaller than that found in the upper reaches, and with the decrease in stream gradient more sand and silt is usually present. Long, and often very deep pools provide protection as well as excellent feeding zones for fish. Stream side cover is generally sparse, ranging from intermittent sections of timber in the upper valleys, to bare stream banks as the river courses through cleared farm land, small communities, and often through urbanized areas near the river's mouth. The diversified spawning habitats that are present in these sections of major rivers make them highly suitable for use by a number of salmon species. Chinook, pink, and chum salmon represent the predominant spawners, and if sockeye are indigenous to the system, they too will utilize this broad and varied habitat.

1.2.3 Tributaries

Tributaries to the major rivers also vary greatly in the type of aquatic habitat they offer. Again, this is dependent to a great deal on elevation and gradient, ranging from the high elevation mountain streams to the low valley type streams. In either case these streams range in size from those just a few feet wide to those nearly equal to the major rivers into which they drain. At higher elevations such streams are generally cold and swift-flowing, offering intermittent

riffle and patch type spawning gravel. Stream side cover is usually dense in the higher elevation streams, as it is in the as yet undeveloped lower elevation areas. Middle and lower valley tributaries are generally more productive, being warmer and containing more nutrients. They tend to have a good pool-riffle balance and provide considerable, generally smaller sized gravel, spawning area.

The tributaries are generally shorter and accessibility more limited than the river mainstreams. In total, they usually provide a major portion of the available spawning habitat. Many of these smaller streams have greatly reduced flows in the summer. They are the major spawning habitat for coho salmon and steelhead and are used to a great extent by pink and chum salmon. The larger tributaries also receive good numbers of chinook salmon.

1.2.4 Independent Streams

The independent streams draining directly into saltwater offer production habitat similar to the lower to middle valley river tributaries. Stream gradients are generally moderate, with gravel riffles abundant. Most of these streams flow through second or third growth timber and immediate bank cover consisting of dense deciduous growth for much of the streams' length. Many of the smaller streams experience reduced flows in the summer months. These streams are generally warmer and highly productive. Virtually all of the independent streams that are accessible produce good-to-excellent numbers of coho salmon and steelhead. The lowland areas are excellent producers

of chum salmon, and some of the larger streams accommodate chinook.

1.2.5 Specific Rivers Having Indian Fisheries

Brief descriptions of some of the river systems on which the principal current Indian fisheries are located are set out in Appendix I.

§ 1.3 Comparative Abundance

In nearly all annals and journals of early Pacific Northwest explorers, the writers remarked again and again on the prevalance *[sic]* of salmon as native food.

According to observations made by Hudson Bay Company fur trappers, the Lewis and Clark expedition, and earlier by Captain James Cook, salmon and steel head apparently used all freshwater streams open to them.

With the invention of the tin can during the mid-1800's, the salmon fishing industry began an intensive exploitation of the species which has continued to the present. Catches of all species of salmon in Puget Sound, e.g., have ranged from a high of over 39 million fish in 1913 to a low of just over a million fish in 1944. The largest single-producing stream to Puget Sound fishermen is the Fraser River located in Canada. The Fraser River system produces exceptionally large numbers of sockeye and pink salmon. A slide occurring in 1913 (due to railroad construction) blocked a significant portion of the sockeye spawning grounds. Catches of this species declined drastically and have not yet fully recovered from this disaster. The average annual catch of about 3.3 million sockeye in the period 1950-1971 was only

36 percent of the average catch for the years 1894-1913. The 1959-1971 catch of Fraser River pink salmon has averaged about 4.5 million fish, or about 20 percent of the potential catches from the estimated capability of the system.

Other species of salmon destined for Puget Sound watersheds have not declined to the degree observed for sockeye and pinks in the Fraser River. The natural freshwater habitat, although depreciated and reduced in area by watershed alteration, pollution, and other man-made activities, continues to produce an economically valuable resource. With contributions from artificial propagation stations, a variety of fisheries are active in pursuit of harvestable quantities of salmon and steelhead.

Extensive commercial exploitation of salmon began in the mid- to late 1800's. Statewide salmon and steelhead commercial catch records have been kept by the U. S. Bureau of Fisheries since 1891 (Tables 18-22). The Washington Department of Fisheries has compiled annual records of the statewide salmon catch since 1935 (Table 23). Beginning in 1946, these records have included salmon sport catches. Estimates of the statewide steelhead sport catch have been made by the Washington Department of Game since 1946 (Table 24).

Since the earliest time of record keeping the accuracy of commercial salmon catch data has become increasingly reliable. Improved communications and staffing by the management agencies and their recognition of the importance of accurate catch records has improved the reliability of these data. In the case of steelhead, the Washington Department of

Game has not gathered commercial landing data, and until 1964 the Washington Department of Fisheries collected it only incidental to collection of salmon catch data. Since 1964 the Department of Fisheries has ceased collection of steelhead data except on the Columbia River. As a result there is no reliable data on the commercial take of steelhead for the coastal and Puget Sound areas since 1964.

Catch records are available from the earliest days of the fishery, but these cannot be directly used to assess the run sizes since some species were fished preferentially and escapements were not estimated. While some races of salmon are extinct, none of the species are endangered and all support various fisheries. The most significant change over the years is that the salmon fisheries have moved farther outward from the river mouths so that, generally, fewer numbers are arriving at the river. There are exceptions to this, particularly for some runs augmented by artificial propagation. Following is a partial resumé of the relative statewide catches of salmon and steelhead by Washington fishermen during the years 1935-1970 (Tables 18-24).

1. Chinook salmon catches ranged from a high of 13.7 million pounds in 1941 to a low of 4.6 million pounds in 1960. The catches remained relatively stable from 1935 to 1955 with an average annual catch of 10.4 million pounds. The chinook landings decreased from 1955 to 1960. Between 1960 and 1967 they remained relatively stable with an average annual catch of 5.7 million pounds. The chinook landings increased from 1968 to 1970 (Figure 6).

2. Coho salmon catches have ranged from a high of 17.4 million pounds in 1952 and 1970 to a low of 2.9 million pounds in 1960. The landings have fluctuated greatly during this period showing no trends. The average annual catch for the last 10 years of this time period was 10.1 million pounds (Figure 6).

3. Pink salmon catches have ranged from a high of 54 million pounds in 1947 to a low of 4.6 million pounds in 1965. The landings decreased from 1935 to 1943 and then sharply increased until 1947. Catches of pink salmon decreased between 1947 and 1970 (Figure 6).

4. Chum salmon catches have ranged from a high of 15.2 million pounds in 1946 to a low of 2 million pounds in 1961 and 1965. The catches declined during the last 20 years of the time period (Figure 6).

5. Sockeye salmon catches have ranged from a high of 35.1 million pounds in 1954 to a low of 1.4 million pounds in 1947. Between 1948 and 1970 the landings were relatively stable with an annual average catch of 10.2 million pounds (Figure 6).

6. Between 1947 and 1971, the catch of winter steelhead by anglers increased. It ranged from a high of 249 thousand fish in the 1965-66 season to a low of 23 thousand in 1947-48. Landings in the Puget Sound and coastal area Indian fisheries since 1945 have ranged from 21 thousand pounds in 1951 to 360 thousand pounds in 1963.

§ 1.4 Environmental Needs of Salmon and Steelhead

1.4.0 Introduction

The dependence of salmon and steelhead on suitable freshwater environment places them in direct competition with other multiple uses of the water. To determine the effect of man-made changes in the environment, requirements of anadromous fish in freshwater must be known.

Salmon and steelhead indigenous to Washington State waters are adapted to a variety of specific habitat conditions essential to their continued production. Although specific requirements by each species may vary slightly, generally their needs are quite similar. These include, but are not limited to, (1) access to and from the sea, (2) an adequate supply of good-quality water, (3) a sufficient amount of suitable gravel for spawning and egg incubation, (4) an ample supply of food, and (5) sufficient shelter.

These are the basic requirements and a detailed description of each is covered below. It is important to remember that alteration of even one of these essential, finely-balanced requirements will affect the production potential.

1.4.1 Access to and from the Sea

Anadromous fish must have free access to and from the sea. To protect the spawning and rearing environment while not providing free access for the adults or unhindered outmigration for the Juveniles would, of course, be pointless. Since adult salmon, and to some degree adult steelhead, do not feed heavily in freshwater, they must sustain themselves on their

storage of energy once they leave the marine environment. Thus, it becomes important to assure their upstream passage without delay which would cause them abnormal expenditure of energy. Such delay in their migratory timing can be as catastrophic as a total block.

1.4.2 Adequate Water Supply

An adequate water supply in itself involves a number of characteristics, each of which presents rather narrow limitations on the production capabilities of a stream. Generally, an optimum volume of well-oxygenated water moving over the natural stream bed provides the necessary space and conditions for fish spawning, egg incubation, rearing, food production, and protection. The timing of the freshwater life phases of these fish is directly affected by the seasonal flow patterns. Successful fish production is also dependent upon optimum water temperatures. The temperature range most favorable to salmon and steelhead through all life phases is 50 to 60 degrees Fahrenheit. Again, the seasonal pattern and its, ranges dictate the production capability of the aquatic environment.

Water quality also presents very narrow limits with respect to aquatic productivity. The water chemistry provides certain nutrients that are picked up naturally as the stream flows seaward. Also the water must be free of pollutants that might reduce or eliminate basic food production or cause direct adverse effects to fish.

1.4.3 Adequate Spawning - Egg Incubation Areas

The stream bed of a river must contain a sufficient amount of suitable gravel riffles for spawning and incubation of deposited eggs. These riffle areas often serve to separate use by the various species of fish. The physical condition of these riffle areas, which can limit the capacity of spawning, include gravel size, amount of sand or silt in the gravel, degree of gravel compaction, and depth/ velocity conditions of water flowing over the riffle. To facilitate production, these riffles must remain relatively free of silt overburden and must provide adequate flow through the gravel itself. Each of the aforementioned characteristics serves to restrict what species and number of fish will utilize the riffles, as well as to limit the overall production potential.

1.4.4 Ample Food Supply

The first requirement for an adequate food supply for fish is that the water offer the basic nutrient productivity gaged by the natural minerals, acidity, temperature patterns, and amount of dissolved oxygen. Relative to this basic productivity is the aquatic insect supply, a primary food. Insect production falls into seasonal patterns which are closely allied to the timing of the fish's freshwater juvenile residency.

1.4.5 Shelter

In order that the fish migration, spawning, and juvenile rearing life history phases take place without undue losses, protective cover is vital. Natural fish production streams usually provide a good pool-riffle

balance, with the pools offering deep and, most often, shaded protection. Additional cover is normally provided by stream bank vegetation, wind-felled logs in or over the stream, and by large boulders which create eddies and shaded zones.

§ 1.5 Habitat Condition Trends Affecting Today's Fishery Resources

1.5.0 Introduction

Over the years, there has been a gradual deterioration and loss of natural fish production habitat in Washington State streams. Although there are many individual factors contributing to this, the general trend toward reduced production habitat is more the result of a combination of activities performed by man--activities which alter and destroy one or more habitat conditions required for successful fish production. Generally, these factors can be categorized under the broad headings of watershed alterations, water storage dams, industrial developments, stream channel alterations, and residential developments.

1.5.1 Effects of Watershed Alteration

The most significant watershed alteration within the State over the past has resulted from extensive logging operations. Logging and road building frequently result in serious degradation of water quality. Even in the uppermost reaches of some watersheds, aquatic environments have been degraded as a result of logging or log road building practices that did not consider the total impact on the ecosystem. The most obvious and most adverse impact of improper logging on water quality is the increased

sediment load caused by erosion of soils from the surface of logged-over areas and from roads. Sediment loads seriously reduce natural propagation by fish by silting of spawning gravels and the smothering of eggs and fry. Often these spawning areas are rendered useless for extended periods of time.

Logging of all trees to the water's edge and removal of other stream-side vegetation expose the stream to the full impact of the sun's heat (solar radiation), causing temperature increases that are damaging to the fishery resource. Conditions of heavy siltation, poor water quality, and unnaturally high temperatures often encroach over stream areas some distance below the actual logging operations. As a result, both spawning and rearing habitats suffer.

In addition, improper logging operations leave organic debris in and adjacent to stream channels. This debris and slash often result in damming the streams, creating virtual barriers to anadromous fish migration. As these organic materials decompose, measurable increases in dissolved chemicals and plant nutrients occur in the streams which cause the growth of bacterial slimes and algae. Increased plant activity also causes a reduction of dissolved oxygen in the intra-gravel waters of the spawning beds as well as in the rearing pools.

Extensively cleared watershed areas tend to exhibit a much different run-off pattern. There is usually a greatly intensified momentary run-off associated with any heavy rainfall. Due to lack of natural water retention, unnatural low flows will also occur in the late summer. Directly associated is extensive erosion of stream bed and stream bank

areas often leading to a total destruction of the fish-production capacity of the streams.

Another habitat alteration which has caused extensive damage to salmon and steelhead runs has been irrigation. The heaviest impact of irrigation is the removal of water from the stream during the critical low-flow summer months. Irrigation through water removal during the summer rearing months often reduces the rearing capacity of the stream. This occurs directly if the return water is at temperatures too high to support salmonid fishes, or indirectly by reducing the remaining volume of flow to a point where solar radiation will heat the water, causing the stream to become unsuitable for salmon and steelhead during the summer months. Irrigation may also cause an enrichment of the stream by returning water over-enriched with fertilizers which may cause an aquatic plant bloom. Such plant blooms may subsequently cause a critical lack of oxygen due to the decomposition of the added organic load in the stream. This water may also contain harmful pesticides and herbicides.

The diversion of water, and consequently juvenile fish, from the stream by unscreened ditches or pumps is a particularly critical problem during the spring and summer outmigration periods. Today, most irrigation districts make extensive use of mechanical screens. However, the magnitude of water removal is such that not all diversions are screened.

1.5.2 Effects of Water Storage Projects

The most dramatic change, often causing a complete loss of the salmon and steelhead environment on stream systems in Washington State,

is the series of dams which has been completed in the last 40 years. A number of Washington's major rivers, plus many of the larger tributaries, have been adversely affected by the placement of water storage dams. Whether they are for the purpose of domestic and industrial water supply, electrical power, or flood control makes little difference. They all impose a number of habitat alterations, most being detrimental to fish production. Several obvious changes in the river environment are known to affect salmon migration. For instance, timing and pattern of upstream migration is associated with the river discharge. Since flood control and hydroelectric dams reduce and prolong the average discharge during high run-off periods when salmon or steelhead are migrating upstream, this can seriously delay the spawning migration. Migration and spawning of adult salmon and steelhead are known to be dependent on energy stores accumulated during ocean residence, and any undue energy expenditure or inefficient utilization of energy during migration can prevent successful completion of the spawning act.

Unless located above natural fish-passage barriers, these projects interrupt and usually block fish migration, preventing adults from reaching their natural spawning grounds. Collection of migrating adult salmon and steelhead for transportation over dams causes many problems, but most importantly it causes another delay in their upstream migration. Short delays of only a few days are known to reduce the productivity of some runs.

Dams not only cause environmental changes in downstream areas but also create reservoirs that can have serious adverse effects on upstream habitat. It is

obvious that reservoirs represent a radical departure from the natural migratory environment and that the altered velocities, temperatures, depths, and other factors might interfere with upstream migration. Reduced velocities in reservoirs result in increased heating of the surface water during the summer. Changes in water temperature affect the rate of energy utilization, swimming ability, and disease susceptibility of these fish.

Dams can produce a multitude of environmental changes that affect spawning efficiency, the survival of incubating eggs, and the emergence of newly-hatched fry. Successful spawning and egg incubation can occur only within certain ranges of environmental conditions.

The most obvious effect of a dam on a spawning stream is the destruction of spawning beds by creation of the reservoir itself. Alterations of the normal discharge cycle can also reduce the availability of preferred spawning velocities and depths. Another less obvious effect on egg mortality is fluctuating temperatures that do not follow the natural order due to sporadic discharges from the reservoir. Abnormal temperatures during the incubation period may cause a high rate of egg mortality and may cause premature or delayed hatching and emergence. Reductions in flow can reduce the subsurface flow that supplies oxygen to incubating eggs and removal of metabolic waste products. Velocity changes resulting from sporadic or extended discharges can alter the gravel composition of spawning areas and lead to increased silt deposition that would reduce the percolation flow to incubating eggs.

One major effect of dams on downstream migrating juvenile salmon and steelhead is the direct mortalities incurred in passage over spillways and through turbines. Another problem is the passage of the juveniles on their seaward migration through long, slow-moving reservoirs. The temperature regime of the reservoir may alter the behavior of the young fish, and the reduction in water velocity may result in delaying the juveniles beyond the normal migratory period. The reduced velocities in the reservoir create a more favorable environment for predators, therefore causing increased predation on the young salmon and steelhead.

1.5.3 Effects of Industrial Developments

Industrially-oriented developments have served to restrict, and sometimes eliminate, fish-production habitat in many Washington State streams. Water supply systems, usually developed for both industrial and domestic purposes, often reduce the amount of available water required for fish production and nearly always alter natural streamflow patterns and/or water quality characteristics. Such conditions are usually prevalent in the upper valleys and mountainous regions where spawning and rearing life phases of fish are affected.

In the more heavily populated and industrialized areas, major rivers and/or their estuaries, and sometimes even small tributaries or independent drainages, suffer from water pollution. This may exist as periodic intensive pollution of permanent low-grade reduction of water quality. Both domestic and industrial pollution can reduce or eliminate natural rearing habitats thus producing

less food and generally causing conditions that sustain fewer fish. Not only can some industrial wastes be toxic to the fish, but the decomposition of sewage can reduce the dissolved oxygen to a point where it will adversely affect salmon and steelhead. Detection of pollution-caused kills of anadromous fish is difficult, but it contributes significantly to mortality of both adult and juvenile fish. It can ruin the habitat of these fish and prevent them from entering important spawning and rearing areas.

1.5.4 Effects of Channel Alteration Projects

Channel straightening and channel relocation projects serve as two of the major problems affecting Washington State's fish production streams. For many years, stream dredging and channelization have been carried out with little attention to the possible long-term effect of these operations on anadromous fish. These projects are generally associated with flood control activities conducted on the major rivers, as well as on many of their larger tributaries.

The channelization of streams eliminates the pools and riffles of a natural stream, thereby eliminating necessary cover and feeding areas for rearing and migrating fish. It may also destroy spawning beds by altering the flow of the stream, making it into a straight raceway. Dredging gravel from stream beds for use, in road building and other uses destroys not only the spawning areas but may also destroy eggs and fry that are already in the gravel. Both dredging and channelization produce large amounts of silt which are deposited downstream, and may ruin downstream spawning areas.

1 .5.5 Effects of Residential Developments

Still another major factor affecting fish production habitat is the trend toward suburban housing development. This consists of anything from summer cabins to large community projects. They are often located adjacent to tributaries of the major rivers and are frequently situated directly on some of the best fish-production habitats that exist in Washington. The overriding effect of such projects is the elimination of natural stream and stream-side cover. Segments of the watershed are essentially paved with gutters, and run-off water from roofs, driveways, and streets is channeled directly into the stream. Often large quantities of additional water are imported into these areas, only to be released as an added supply, one that is somewhat different in quality from the natural run-off. The results are changes in stream run-off patterns; increased flooding and, hence, increased stream bank and stream bottom scouring; and, particularly during the summer months, a deterioration to some degree of the existing water quality. Secondary effects associated with such developments include culvert and bridge installations, stream bed modification, and a disruption of natural fish behavior due to the fact that there simply is more activity conducted in and around the stream proper. The result is a tendency for discontinued use by major segments of fish populations that would normally inhabit these waters, and a greatly reduced spawning and rearing capacity of the stream.

§ 1.6. Ocean Migration of Puget Sound and Washington Coastal Salmon and Steelhead

It is intriguing and important to the fisheries management biologist to examine the vast amount of ocean migration data which have been obtained through various tagging and fin-marking studies carried on by fisheries agencies, both Federal and State, over the years. Ocean movements are generally known for all species and well established for some stocks. While studies of marine migrations have been directed entirely to salmon species, incidental data on steelhead has begun to disclose definite patterns of ocean residency. It is immediately obvious that salmon and steelhead do not recognize state or even international boundaries and that a complex intermingling occurs between stocks from Washington, British Columbia, Oregon, California, Alaska, and Idaho (Figures 7-9).

1.6.1 Chinook Salmon - General

For administrative purposes of the Washington Department of Fisheries, chinook salmon stocks of Washington are basically divided into three management areas: (1) Columbia River, (2) coastal, and (3) Puget Sound. Fraser River salmon stocks constitute a fourth group of major importance to Washington fishermen specifically, and U. S. fishermen in general while the Columbia River is a major producer of chinook and other salmon taken in the case area, coverage of their distribution in the ocean catch is not herein discussed in detail.

1.6.2 Washington Coastal Chinook Stocks

The chinook-producing streams tributary to Grays Harbor and Willapa Bay, plus the rivers draining the northern Olympic Peninsula and emptying directly into the Pacific Ocean, constitute one major chinook-producing "group." The Olympic Peninsula stream data are projected from studies on Grays Harbor and Willapa Bay stocks. In this area, a dominant northward movement is apparent with various marking experiments indicating that over 75 percent of the ocean catch occurs off British Columbia and Southeastern Alaska (Figure 7). The ocean availability of these fish appears to be considerably lower than for lower Columbia River fall runs, however, and the percentage of the runs escaping the ocean fisheries is greater. Returning fish make important contributions to the commercial net, river sport, and Indian fisheries.

1.6.3 Puget Sound Chinook Stocks

Puget Sound chinook exhibit the typical northward migrations shown by other stocks of the species, although a minor segment disperses southward (Figure 7). The magnitude of this latter group diminishes rapidly from north to south along the Washington coast, becoming quite minor off the Columbia River mouth. The prevailing ocean migration pattern results in an ocean catch distribution of about 90 percent of the total ocean catch occurring off British Columbia and Southeastern Alaska and only about 10 percent off the Washington coast. On return from their ocean residency most of the U. S. Puget Sound stocks enter through the Strait of Juan de Fuca; however, a portion

of some, such as those destined for the Bellingham and Samish Bay areas, it is believed to return through Johnstone Strait. From the standpoint of Washington salmon fisheries, these stocks have two important "positive" features. First, sizable numbers remain in "inside" waters for appreciable periods and these immature, feeding fish make important contributions to the sport fisheries. South of the Tacoma Narrows area they are the dominant component of the 2-year-old chinook sport catch, while older fish bolster the sport fisheries throughout Puget Sound. Others are taken in the Strait of Juan de Fuca, in the San Juan Islands, and in the Strait of Georgia (Canada) sport fishery.

Second, the immature Puget Sound fish that do move seaward are definitely less available to the ocean fisheries than several other major stocks, such as lower Columbia River fall-run chinook. Experiments have shown that in the ocean they are taken mainly as maturing 4-year-old fish. Consequently, a greater percentage of the run returns to Puget Sound for exploitation by the commercial net, sport, and Indian fisheries.

1.6.4 Fraser River Chinook Stocks

Chinook produced in the Fraser River system and other large rivers draining Southern British Columbia show similarities to Puget Sound fish. A typical northward movement is evident, with the bulk of the ocean harvest occurring off British Columbia and Southeastern Alaska (Figure 7). A lesser segment moves southward to enter the Washington ocean catches. The availability of the fish and ages at capture also appear to be roughly comparable to

U. S. Puget Sound stocks. Substantial numbers of immature, feeding chinook remain in inside waters for extended periods of time and enter the sport fisheries. Salmon produced in British Columbia streams appear to be the dominant stock in the Strait of Georgia and San Juan Islands sport fisheries. Sizable numbers are also taken in the Strait of Juan de Fuca and the northern portion of inner Puget Sound. Returning adults are the dominant stocks in the Canadian net fisheries of Georgia Strait and the Fraser River and the San Juan Islands-Point Roberts fisheries of Washington.

An interesting picture is presented by examining the freshwater recoveries of immature chinook tagged in several important Puget Sound sport fishing areas. The recovery areas include the Fraser and Columbia River systems plus nine Puget Sound drainage areas (Figure 10). It is evident that the success of fishing in any given marine area is dependent on the production from many river systems; or, perhaps more meaningful, the production from each drainage, resulting from both natural and artificial means, is important to many specific fisheries. Thus, if the potential of any given river is physically impaired by power dams, water pollution, or watershed damage, the impact on the stocks and subsequent harvest can be much more extensive and far-reaching than commonly presumed.

1.6.5 Chinook Salmon - Overall

Through a general understanding of each major chinook stock in regard to population size, ocean migration, and availability factors, it is possible to estimate the river origins of major stocks contributing

to each definable Washington fishery. In Figure 11, the stocks are shown in order of their importance. For example, off Sekiu and Pillar Point on an average season basis, Columbia River fish are the largest single contributor to the catch, followed in order by Puget Sound, Fraser River, Washington coastal, and Oregon coastal fish. Many other stocks are often present but are not considered to be of major significance to the local fishery. During certain periods of time, this picture does not always hold true, but research studies enable the manager to define catches by specific time intervals for many of the fisheries involved. These data are based upon the digested outcome of literally hundreds of different investigations.

1.6.6 Washington Coastal Coho Salmon Stocks

Coho produced in Grays Harbor and Willapa Bay tributaries differ markedly from their nearby Columbia River counterparts. The results of studies from these drainages have been projected by the Washington Department of Fisheries to depict the marine migration patterns of the Peninsula coastal streams. Their primary dispersion occurs to the north (Columbia River coho primarily disperse southward), with the ocean harvest being mainly in the fisheries operating off central and northern Washington (Figure 8). In addition to those taken in the Washington troll fishery, sizable numbers move off Vancouver Island and are exploited by the Canadian troll fleet. Others enter the outer portion of the Strait of Juan de Fuca, contributing to the Canadian and U. S. net fisheries in that area and to the Washington sport fisheries. Returning adults enter the landings of the Indian and river sport fisheries. The harvest of

"jacks" reaches significant proportions only in the river angler's creel. The movements of coho produced in Washington coastal streams north of Grays Harbor have not been carefully studied, but the limited evidence available points to significant ocean movements both to the north and south.

1.6.7 Puget Sound Coho Salmon Stocks

Puget Sound coho exhibit the typical north and south migrations in the ocean, with their abundance declining steadily from south to north along the west coast of Vancouver Island and from north to south along the Washington coast line (Figure 8). Apparently, relatively few of these fish move south of the Columbia River or north of Vancouver Island. As a result of this migration pattern, the ocean catch distribution is divided about equally between the fisheries off Washington and British Columbia. These stocks also contribute materially to the Washington and Canadian net fisheries operating in the Strait of Juan de Fuca and to Washington's Straits sport fishery and net and sport fisheries of inner Puget Sound.

Puget Sound coho differ markedly from coastal stocks discussed previously in that sizable numbers remain in Puget Sound and never migrate to the open sea. These resident, feeding fish form the backbone of the sport fishery, with drainages nearest the available foraging (and fishing) areas often being the main contributors to the catch.

1.6.8 British Columbia Coho Salmon Stocks

Coho produced in British Columbia streams are known to be of importance to several Washington

fisheries. Fish from the west coast of Vancouver Island and the Strait of Georgia drainages, particularly the Fraser River, move south off the Washington coast and contribute to the troll and sport fisheries (Figure 8). Their abundance, however, diminishes rapidly from north to south. Fish from the Strait of Georgia tributaries make substantial additions to the net fisheries of the Strait of Juan de Fuca and San Juan Islands. Resident coho of the type noted in Puget Sound appear to be the dominant constituent of the San Juan Islands sport catch.

1.6.9 Coho Salmon - Overall

It is possible to estimate, with a reasonable degree of accuracy, the major coho stocks contributing to Washington's salmon fisheries on an annual basis (Figure 12). In contrast to chinook, the major stocks of coho are much more likely to originate in drainage systems near each definable fishery. This phenomenon is produced by several interrelated factors. Since coho, on the average, spend considerably less time in the marine environment due to their younger age at maturity, their distance of migration tends to be much less than chinook. They also commonly show random dispersions both to the north and south in contrast to the predominantly northward movements of chinook. Lastly, and probably most important, their "catchability" or susceptibility to hook-and-line gear does not diminish as rapidly as fall-run chinook as they mature and approach their streams of origin.

1.6.10 Pink Salmon

Pink salmon taken in the ocean fisheries originate from Canadian streams (mainly the Fraser)

and Puget Sound tributaries. Migrations are both north and south with the primary diffusion northward. Catch distribution is shifted northward and favors the Canadian fishery off the west coast of Vancouver Island as the pinks return to spawn. They are also taken in the Strait of Juan de Fuca by net and sport fisheries of both countries. Significant portions of the pink salmon runs occasionally migrate toward spawning grounds in both Canada and the United States through Johnstone Strait and the Gulf of Georgia. When this occurs, a sizable catch is made in these areas by Canadian net fisheries. Both commercial and Indian net fisheries take considerable quantities of pinks as this species nears or enters natal streams.

1.6.11 Chum Salmon

Chum salmon of all origins have declined drastically over the past two decades. Few of this species are caught in the ocean fisheries and their migration patterns are not fully known or understood. Feeding and migration studies conducted in the Gulf of Alaska by the Federal Government indicate the presence of many feeding chum salmon in this area. Results of tagging studies to date indicate that chum salmon of Washington origin are not a major component of the chum salmon populations in the Gulf of Alaska.

2.6.12 Sockeye Salmon

By far the major river system contributing to fisheries for sockeye is the Fraser River. Sockeye exhibit a northerly movement, and upon their spawning migration, increasing numbers are taken by Canadian trollers off the West Coast of Vancouver

Island. The bulk of the harvest is by Washington and Canadian net fishermen in the Strait of Juan de Fuca and the San Juan Islands as the fish near the mouth of the Fraser. A significant segment of Fraser-bound sockeye migrates through Johnstone Strait and enters the Fraser without first entering U. S. waters. Canadian net fisheries take almost the entire harvestable portion of this segment.

Lake Washington sockeye exhibit the same northerly movement as Fraser stocks, but evidence of similar migrations through Johnstone Strait has not been found. Thus, the major portion of this run is assumed to enter Puget Sound by way of the Strait of Juan de Fuca. The entry of the Lake Washington portion of this run coincides with the entry of the early Fraser River portion.

1.6.13 Steelhead

Knowledge of the ocean phase of the steelhead's life history is relatively limited. Some information has become available incidental to high seas salmon investigations, which indicates that Washington State steelhead spend at least a part of their ocean residency in the Alaskan gyre.[1] Figure 9 shows the ocean areas inhabited by Washington, Oregon, and California steelhead stocks. Steelhead from Canadian and Alaskan streams commingle in the ocean with the southern stocks.

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[1] A gyre is an ocean eddy which, in the north Pacific, rotates over a large area in a counter-clockwise direction. Salmon and steelhead are believed to swim generally downstream with this current.

§ 1.7 Inshore Migration of Salmon and Steelhead

1.7.1 Migration Routes of Salmon within Puget Sound

Figures 13-17 show the approximate average pattern of migration in Puget Sound for each of the five species of salmon. As a group, these figures illustrate the geographic intermingling of all species, some of which have representative stocks from virtually all Puget Sound streams. The complexity of regulating the Puget Sound marine area fisheries is further appreciated through this illustration. This is particularly true for chinook, coho, and chum salmon.

1.7.2 General Migration Timing of Salmon within Puget Sound

The general timing of outmigration (from freshwater to marine feeding grounds) of salmonid juveniles has been previously discussed in Sections 1.1.0-1.1.7. The general timing of adults entering freshwater is also presented in those sections. It is the purpose of this narrative to present more specific run-timing data where available.

The management areas (fishing areas and preserves) established and used by the Washington Department of Fisheries in regulating the Puget Sound commercial salmon net fisheries are shown in Figure 18. Commercial salmon fishing is generally prohibited in the salmon preserves. The combined "catch area" designations which were used in developing the run-timing curves are shown in Figure 19. These run-timing curves (Figures 20-24) have been developed from daily commercial catch data

collected over a number of years, and have been smoothed by 5-day averages. Except for chinook, these figures represent the average timing of the run passage through each specific catch area. Commercial net fishing has not been permitted during the early portion of the chinook run and, therefore, run-timing data are not available as such. However, occasional test fishing has established that this timing curve is generally bell-shaped.

The spring chinook run is the first salmon species to enter Puget Sound through the Strait of Juan de Fuca on its migration toward freshwater. This run is closely followed by summer and fall chinook and sockeye salmon during June, July, and August. Coho begin entering Puget Sound during the latter part of August and continue throughout September and October. During odd-numbered years, pink salmon enter between the chinook and coho runs. Chum salmon enter from September through December with the peak occurring during October and November.

The above description is general. The latter part of one run usually overlaps the beginning of the following run. If low water conditions exist in the natal stream, these runs may delay at the stream mouth in such a manner that there is little timing difference even between the peaks of the different runs. There are many exceptions to the rule. These runs are made up of segments bound for all major rivers in Puget Sound. Individual run segments may vary depending on genetic and environmental factors.

1.7.3 General Migration Timing of Salmon and Steelhead in Coastal and Puget Sound Rivers

The same type of data used to develop the curves introduced in the preceding section have been developed over a number of years for some Indian river fisheries, principally those on the reservations. Records of off-reservation landings are incomplete. Figure 25 shows the general location of these fisheries, both in Washington coastal and Puget Sound drainages. Figures 26 through 34 provide timing curves of steelhead and Figures 35 through 41 provide timing curves of chinook, coho, and chum salmon, and where present, pinks and sockeye as they pass through several of these Indian river net fisheries.

As can be seen from these figures, a general statement concerning timing of river entry cannot be made. Each river must be looked at individually. Moreover, run-timing varies from year to year depending on weather and run-off conditions. In marine fishing areas, the different salmon runs follow a general migration timing pattern, but as they approach or enter the natal stream they tend to develop a timing which is unique to that particular run and river.

§ 1.8 Natural and Artificial Propagation

1.8.0 Introduction

Artificial propagation programs and efforts are discussed more extensively in Part II of this report. This section is limited to a brief summary of the relative extent of the contribution of such propagation

to the total resource available to Washington Puget Sound and coastal areas.

In reviewing all figures which denote the percentage of natural versus artificial production harvested in the various fisheries, it must be remembered that these figures represent averages. As the level of artificial production rises and the level of natural production fluctuates due to environmental changes, these figures also change, usually on an annual basis. In cases where the timing of the runs bound for a hatchery is slightly different than the natural run-timing, the contribution to a fishery may also fluctuate greatly on a weekly or even a daily basis.

1.8.1 Chinook Salmon

The Washington Department of Fisheries estimated that 40 percent of the total fall chinook catch in Washington coastal and Puget Sound fisheries can be attributed to hatchery production. In the case of fall chinook which enter the Strait of Juan de Fuca and Puget Sound net fisheries, both United States and Canadian, 40 percent are estimated to be of Fraser River stock and 60 percent from Puget Sound streams. Thirty-six percent of this latter figure are estimated to be of hatchery origin.

Spring and summer chinook result almost entirely from natural production, although major strides are being made in the artificial production of spring chinook. Artificial means of production are just beginning to be adapted to summer chinook.

1.8.2 Coho Salmon

Coho salmon also have been successfully adapted to artificial production. Therefore, as with chinook, the percentage of annual harvest which can be attributed to natural production fluctuates greatly, depending upon the success of the natural spawn and the level of the hatchery releases into each specific river. Daily and weekly fluctuations also occur because of the differences in migration timing between natural and artificially produced stocks. Due to the more rigid 3-year life cycle of the coho and the freshwater rearing phase of these fish, the annual natural production of coho tends to fluctuate more than does the fall chinook production.

Of those coho taken in the Puget Sound net fisheries, 20 percent are estimated to be of hatchery origin. On a weekly basis, these percentages may be in excess of 90 percent or as low as 0 percent, depending upon the timing and production level of each specific hatchery, the origin of the fish, and levels of natural production.

1.8.3 Pink, Chum, and Sockeye Salmon

Except for limited success with chum and pink salmon at specific hatcheries, these three species have not yet been successfully adapted to artificial production to the degree chinook and coho have. Therefore, the total production for these three species can be essentially attributed to natural production. There are presently no widely employed means of supplementing the natural production of these species as there is with chinook or coho. If an area does not receive an adequate spawning escapement, or if man-made or natural environmental stresses cause poor

survival of these species, there presently is no way of replacing this loss by artificial means.

Although the means of propagating these fish artificially within a hatchery has not been extensively developed to date, some progress is being made in the field of developing artificial spawning channels. An artificial spawning channel is basically a man-made stream in which optimum spawning conditions have been developed. Water flow, turbidity, predation, and gravel size are controlled so that adverse man-made and naturally occurring environmental phenomenon (floods, freezing, drought) rarely affect the survival of the spawn from egg to emerging fry. These channels have been successfully developed at limited locations for sockeye (Baker River), chinook and coho (Columbia River), chum (Vancouver Island, British Columbia), and pinks (Fraser River).

The Department of Fisheries is presently developing a chum and pink egg incubation channel at the Skagit Hatchery with plans to develop these channels in other locations also. These channels differ from the artificial spawning channel described above in that the eggs and sperm are taken artificially. The fertilized eggs are then placed in incubation trays rather than in the gravel. Plans also call for short-term feeding prior to release.

1.8.4 Steelhead

Steelhead hatchery operations form an important part of the management program in Washington. Their importance will increase with continued water development and diversion, environmental deterioration, and the reduction in suitable spawning areas as well as increased

recreational demands. Similar to coho, the steelhead production in the natural environment is controlled greatly by the quantity and quality of stream discharge during the annual low flow periods. In the case of steelhead it is particularly critical since they most commonly spend two years in freshwater before migrating to sea. A large portion of the Game Department's scientific investigations on steelhead has been directed toward improving the use of the hatcheries as a management tool. Game Department records indicate that good survival (8-10 percent) from smolt to adult has been experienced at some facilities.

In recent years the use of rearing ponds has proven biologically and economically feasible and is being employed increasingly in the steelhead management program.

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II. MANAGEMENT OF THE RESOURCE

§ 2 Management of the Resource

§ 2.0 Introduction

Fisheries management means maintaining and enhancing the fishery resources and the aquatic environment and establishing controls on the harvest. In this part we will consider fisheries management programs in terms of their objectives, methods of accomplishment, and the activities of various management entities.

§ 2.1 Management Objectives

2.1.0 Introduction

Fisheries management takes into consideration both the resource itself and the objectives and needs of the societies which control and seek to utilize it. The anadromous fishery resource is both perishable and renewable. Thus, while an over-harvest could imperil its renewability, an under-harvest during the limited time it is available would result in an irreplaceable waste of the resource. Fisheries management seeks to avoid both of these adverse results and to maintain the stocks at a level which will permit the optimum yield from one fish cycle to another. But the "optimum yield" of the different types of fisheries must be considered in broader terms than just the quantity of fish product obtained. Because in today's society fish resources serve broader needs of man than nourishment. The commercial, sport, and Indian fisheries are managed for different use objectives and user interests. Accordingly, the objectives of fisheries management vary in accordance with the purposes

and constituency for which the particular fishery is being managed.

Commercial fisheries are managed to achieve a maximum sustained yield in terms of food and economic profit whereas sport fisheries are managed to achieve a maximum sustained recreational experience and a high yield of personal use food and "trophy" product. The Indian tribes have as their primary use objectives the fostering of Indian economic well-being, the preservation of their cultural heritage and way of life, and the provision of a significant element of Indian diet.

2.1.1 Commercial Fisheries Management

Managing the fishery for maximum sustained profit requires, among other things, that the harvest occurs near the time when the available "crop" has attained maximum bulk and quality. These do not necessarily coincide in time and place. Thus the proper time for commercial harvest corresponds most nearly to the relatively brief period of time when the fish are full-grown and returning to or entering their natal stream to spawn. Net fishery seasons permit the efficient taking of mature or nearly mature fish for commercial purposes during this time period only.

2.1.2 Sport Fisheries Management

Managing for maximum sustained recreation requires providing ample opportunities for fishing. Long seasons, economically and geographically accessible waters, and high catches per individual effort all increase recreational yield. Angling is the accepted method of recreational fishing for salmon and steelhead. It involves catching the feeding fish

with baited hooks or lures. Generally, salmon are taken in the marine areas and steelhead in freshwater streams.

Feeding and growing salmon in the ocean and Puget Sound are of greatest recreational value because they are vulnerable to sport gear over a long period. On the spawning migration route from their saltwater feeding areas, full-grown salmon are available to anglers for only a short period of time. Feeding activity of these latter fish diminishes or ceases as they complete their saltwater migration. The efficiency of angling gear is then measurably decreased. In some Puget Sound areas where salmon are in or approaching their natal estuary, the catch rate is commonly one-tenth that of the ocean fishery.

In contrast to salmon, steelhead actively feed throughout their entire spawning migration route and are readily available to sport gear in freshwater areas. They are not generally taken by sport gear in saltwater.

2.1.3 Indian Fisheries Management

Management for Indian objectives is closer to commercial management than to sport inasmuch as pursuit of an economic livelihood and the efficient procurement of a food supply are major purposes. In addition, salmon and steelhead have special significance in the religious, cultural, and mores of the Indian people. Because of traditions, treaty provisions, and location of Indian communities, the Indian fisheries are largely place-oriented. Management for Indian fishery objectives must take this factor into consideration.

§ 2.2 Management Methods

2.2.0 Introduction

Fishery management methods are related to the life history characteristics of the resource discussed in Part I of this report. The life histories of salmon and steelhead are cyclic. The harvest today, particularly with respect to salmon, can occur in a number of locations on their migration and at several phases of their life progression. During a substantial part of this migration and development, fish of different species, races, and river systems are intermingled to both known and unknown extents. These facets of the anadromous salmonid fisheries make the task of management a complex and difficult one--one in which forecasts of constantly changing variables play a key role.

While there are a number of managers and policies governing the management of salmon and steelhead, the methods or techniques employed by each are essentially the same. All managers are faced with a growing demand on the resource coupled with a serious deterioration of the natural habitat.

2.2.1 Assessment of the Freshwater Habitat

In the management of salmon and steelhead, an assessment of the resource must be made. One of the first steps in assessing the existing or potential level of the resource is to evaluate the freshwater habitat condition. A survey of spawning, rearing, and migration habitat, and water quality on each watershed is needed. Examples of information collected on surveys of salmon and steelhead habitat include type of surrounding terrain, type and amount

of stream bank cover, stream gradient, fish migration blocks, stream bottom composition, and pool-riffle profiles. The relative measures of potential spawning and rearing area available in each stream are determined from these surveys. These basic data also are used to evaluate fish or habitat losses that may result from water development projects.

2.2.2 Assessment of Fish Stocks

The run size is determined by adding the total catch to the total escapement; however, this method of measuring run size can only be completed after catch and escapement have been analyzed. Estimations of run size must be made before and during the fishing season to assure an adequate escapement for spawning purposes, and to alert the fishermen to the need to increase or decrease their gear for that season. Several methods of estimating run size are used so that the information may be applied to current regulations. One of these is to relate spawning ground counts--either total or index--and hatchery plants to the subsequent catches and escapement. Run size is also estimated by tagging a representative segment of the population and, .through recovery programs in the ensuing fisheries, determining the tagged-to-untagged ratio. Relating catch-per-unit of effort to past years' data can also provide gross estimates of run size during the fishing season. Measurement of numbers of juveniles in streams and estuaries gives some idea of mortality rates and a gross estimate of size of the returning adult run.

2.2.3 Habitat Protection and Improvement

Habitat protection, rehabilitation, and enhancement are major efforts in the management of

salmon and steelhead. Habitat protection is concerned mainly with the prevention of loss or reduction in production potential in spawning and rearing streams. One of the most important means of habitat protection is setting restrictions on any project that will use, divert, obstruct, or change the natural flow or bed of any river or stream. Habitat rehabilitation involves restoring production potential in streams that have been altered by man or nature. It includes clearing log jams and debris from streams, stabilizing stream banks, and desilting of spawning areas. Providing access to spawning and rearing areas by either laddering or removing natural blocks to migrating fish is an example of habitat enhancement. Protection and restoration of freshwater migration routes and estuarine rearing areas are increasingly important tasks facing fishery managers.

2.2.4 Artificial Propagation

The first Pacific salmon hatchery was established by the Federal Government on the McCloud River (a tributary to the Sacramento River) in 1872. Since that time hatcheries proliferated throughout the coastal states as their effectiveness as a tool in fishery management was recognized by the State and Federal fishery agencies. Hatcheries are not generally considered to be a substitute for natural production except where water development projects have entirely precluded the production from the natural habitat. Instead they are a means of supplementing and rehabilitating natural production.

The greatest success in hatchery operations has been with coho and fall chinook salmon and steelhead. These represent the bulk of the total artificial production. Recent research has led to development of

techniques which indicate that other species may be successfully produced artificially. Hatcheries specifically operated for spring chinook have been increasingly successful. In addition to hatcheries, artificial spawning channels and natural rearing ponds have become important management tools.

2.2.5 Regulating the Harvest

2.2.5.0 Purposes of Regulation

Most fishery harvest regulations rest on two fundamental precepts. The first is that stocks of fish should be protected since they are exhaustible and can be destroyed. The second precept is that as fish grow older they grow larger--up to a certain age--and it is desirable to protect the young and allow them to become older so that the harvest can take advantage of growth.

Under the present complex harvest scheme there are three main purposes of regulation:

1. To preserve the fish stocks--salmon and steelhead are extremely valuable and vulnerable, and regulations are necessary just to maintain a stock;
2. To attain the maximum sustained yield;
3. To provide an orderly fishery--today more people want to fish than are needed to harvest the resource.

To accomplish this all the runs and races that spawn in the multitude of streams of the Puget Sound and coastal area should be recognized and defined. Each stream has one or more of five salmon species plus steelhead, and many rivers have several races of

one species. In order to regulate effectively, it is desirable to have:

1. Accurate catch and escapement statistics on all races;
2. A forecast of run size;
3. Estimates of the number of spawners that can be accommodated in the streams used by each one of the units of stock;
4. Information on the number of units of gear, their efficiency, and the amount of fishing that is needed in order to make the catch.

Limitations on the harvest to assure run survival can be grouped into two major categories--those designed to protect selected portions of a stock of fish and those designed to limit the size of the take.

2.2.5.1 Protecting Selected Portions of Fish Stocks

Included in the broad category of protecting selected portions of a stock are four approaches: (1) net restrictions; (2) closed areas; (3) closed seasons; and (4) size and weight limits.

1. Net restrictions. Examples of restrictions on nets in the salmon fishery include mesh size, either maximum or minimum, of purse seines, gill nets, and reef nets.
2. Closed areas. Selected areas are closed to fishing for a number of different reasons, only a few of which pertain to protecting selected portions of a stock. The usual selective closure in the salmon fishery is to assure protection to a weak run in a vulnerable position, such as a milling or holding area, migration obstructions, areas of concentrated passage, or the spawning

ground. Closed areas are relatively easy to administer and, as a result, are popular with those who must enforce the regulations. Salmon preserves are examples of areas closed to commercial fisheries to protect mature salmon in vulnerable positions near their home streams. Generally, sport fishing, being less efficient, is not excluded from such areas.

3. Closed seasons. Limitations in fishing time may be particularly effective in adjusting the fishing pressure on selected portions of a stock. These may take the form of long-term closures in which fishing is not permitted on a specific stock, or short-term closures which adjust the number of days fished during a week. In the former, e.g., summer chinook of Skagit River origin are protected from commercial harvest by a closed season in Skagit Bay during time of passage in this location. This may be followed by a commercial fishery for fall chinook which may be limited to 2 or 3 days per week in the same area. Closed time can be ineffective or harmful if applied without sufficient knowledge of the stocks of fish. Incorrectly used, it may permit overfishing of some stocks and underfishing of others.

4. Size and weight limits. Size and weight limits on salmon and steelhead are applied to the commercial troll fishery and to the sport fishery to protect the immature fish. Size limits are also applied to the gill net, reef net, and purse seine fisheries in conjunction with mesh size regulations.

2.2.5.2 Methods of Limiting Size of Catch

Three methods of limiting the total catch are: (1) by catch quota; (2) by limitation of number of fishing units; and (3) by limiting the efficiency of gear.

1. Limitation by quota. Limitation by quota is used only in a very few special situations in salmon management. The quota system is only used when there is a fairly sophisticated knowledge of the size of the run and the proportion that should be taken. The quota system is sometimes used in salmon fisheries management when a run of fish is to be divided between different groups of fishermen. Bag and possession limits are examples of quotas.

2. Limitation of number of fishing units. The limitation of total units of commercial fishing gear through limiting the number of persons who may participate has not been a popular method of regulation in North America. The chief argument in favor of limited entry is that it will allow the application of improved fishing methods which result in greater efficiency and lower cost. License limitation has not yet been accepted by the legislature. Limitation of number of units of gear that an individual may use is a common regulation.

3. Limitation of efficiency of gear. One of the most common regulatory techniques is to limit the efficiency of the gear. This is done in a number of different ways. Almost all of the methods described earlier to protect certain portions of the stock can be used to limit efficiency (or reduce efficiency as a side effect). In addition,

efficiency can be reduced by limiting the type of gear, the amount of net, the type of material, or the size of the boat.

2.2.5.3 Regulations to Decrease Gear Efficiency

Regulations aimed at decreasing gear efficiency almost automatically restrict technological developments. State laws in Washington, for example, prohibit the use of monofilament nylon nets, electronic fish finders, or airplanes for spotting, although all are of demonstrable help in increasing the efficiency of salmon fishermen. Restriction of gear efficiency has social implications. The pressure for reduction of gear efficiency evolves sometimes from conflict between owners of different kinds of gear as to who should be allowed to fish. Often the result is that the most efficient gear is banned. Fixed gear is usually the first to go under this kind of social legislation. Examples of this in the history of the Northwest are the elimination of fish wheels and traps on the Columbia River and traps in Puget Sound and Alaska.

Much of the difficulty in controlling the harvest results from the fact that, until the fish has actually been legally caught, the individual fisherman has no property rights and it is not under his control. The root of the problem is that an individual fisherman has no incentive to maximize the yield from given stocks of fish. If he does not catch them, someone else does, so he cannot save them for the future. Although the need for management and the methods used depend on biological analyses, the actual techniques, like the ultimate objectives, involve political and economical considerations.

E3000 Pond Smolt Production
AT-004-13

Tribal Reservations within
the U.S. v WA Case Area
Legend
Tribal Reservation
Major Streams
Water Resource Inventory Areas
Washington State
AT-008-7

Attachment A: Washington Department Of Fish And Wildlife Illustration Entitled Pacific Salmon Lifecycle

Attachment D: Photograph Of A Culvert On A Tributary To The Nooksack River (Bates No. 02-002315)

Attachment E: Photograph Of A Culvert Showing Elimination Of Rearing Habitat With In *[sic]* A Culvert (Bates No. 02-002366)

Attachment G: Photograph Of Culvert At Red Cabin Creek Filled With Sediment Prior To Dredging (Bates No. 02-002180)

Attachment J: Photograph Or *[sic]* Culvert At Red Cabin Creek After Dredging (Bates No. 02-002281)

Attachment K: Photograph Of Culvert At Red Cabin Creek Showing Dead Adult Salmon (Bates No. 02-002194)

Attachment L: Photograph Of Culvert At Red Cabin Creek Showing Dead Adult And Juvenile Salmon (Bates No. 02-002204)

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120 Year Screened Benefit Cost Analysis
WSDOT Fish Passage Program
Final Options
Schedule 9/29/03

Background

1. References
WDFW Habitat Program SHIRAZ Section, WSDOT Fish Passage Inventory, Fish Passage Assessment and Priority Explanation, April 2001 – 7 pp.

Kahle – 1993 Economic Analysis of Report – 30 pp.

WDFW Washington State Salmon Catch Trends 1993 – 41 pp.

2. Analysis
Fix Barriers Job to correct (smaller change with area-criteria and corrections)

1997-2000: 81 barriers corrected (21 dedicated projects, 25 "matching" projects)

1991-2003: $16.8 K per correction with an assumption that future projects will average $250 K in 2003 dollars

1991-2003: For 81 dedicated corrections projects that have a Priority Index (PI) and a stream length upstream, an average of 5.36 [stream meters were opened, resulting in a gross – project basis of 3,202 adult equivalent (AE) salmonids (transient and anadromous) consumed) per project on an annual basis. This translates to 0.3 AE salmonids per linear meter.

3. Future Cases and Options – assuming all barriers will be corrected
Option 1: The correction rate that was in effect when the WSDOT/WDFW passage program was solidified in the 91-3 biennium – 7.1 corrections/yr for 120 years.

Option 2: The correction rate resulting from the average number of corrections in 1997-2000 – 12.5 corrections/yr for 70 years.

Option 3: The 20-year correction plan: 4.0 corrections/yr for 20 years.

Option 4: The 10-year correction plan: 15.5 corrections/yr for 10 years.

AT-104

Potential Harvest and Values

Retail Values per AF

Species	1997 Commercial Value ($/AF)	2001 Commercial Value (Assumed $5/AF) (25% annual inflation)	2001 Recreational Value (Assumed $5/AF) (Minimum estimate)
Chinook	28.72	36	36
Chum	4.18	11	11
Pink	1.67	2	2
Coho	10.61	13	13
Sockeye	13.04	25	25
Steelhead	22.15	28	28
Others (including resident salmonids)		16 (weighted)	16 (weighted)

"Potential" Harvest Rates (1995 = 2001 and later)

Species	Commercial			Recreational		
	Commercial (000)	Adjusted Commercial for WA stocks (000)	Harvest Rate (balancing 50% reward for conservation & 25% for revenue)	Recreational (000)	Adjusted Recreational for WA stocks (000)	Harvest Rate (assuming 50% reward for conservation & 25% for revenue)
Chinook	142	107	19%	90	130	23%
Chum	766	574	14%	14	14	1%
Pink	2,161	1,621 (assumes 25% of total commercial)	40%	116	87 (assumes 25% of commercial)	13%
Coho	602	602	12%	137	137	11%
Sockeye	415	83 (assumes 20% of total commercial)	8%	100 (assumes 20% of commercial)	20 (assumes 20% of commercial)	2%
Steelhead	71	28 (assumes 40% of commercial)	21%	28	28	13%
Others (resident, hatchery, unknown)		Variable (assumes	0			20% (assumes 20% of total commercial & recreational)

Other Assumptions and Information

1. Benefits are considered conservative because ecosystem values not included (e.g., aquaculture, recreational values are excluded (e.g., water consumption use, tribal ceremonial); open values are at commercial values, agricult - values not included (e.g., benefits to ocean industries if stocks not listed under ESA). Cost is partially weighted recognizing that future projects will open true habitat once their extent is corrected.

2. Costs are considered linear because tapering efficiencies were not considered.

3. Annual harvest benefit = $12,350 commercial + $7.1m recreational + $15.5m approx. - see attached table for AF production and benefits per contractor.

4. Social discount rate used 3

5. Annual inspection and maintenance cost to keep corrected barriers passable = 1% of construction cost (i.e. $2.5 k per year)

Option Analysis

Option 1
Benefit = 456 barriers (no-one would contribute) ($19,850) = $1,461,529,050 (today's dollars)
Cost = 456 barriers [($250,000) + (60 year mean connection $32,500)] = $141,469,000 (today's dollars)
B:C = 2.45

Option 2
Benefit = 456 barriers (37-year mean connection + 46 years) ($19,850) = $1,185,436,000 (today's dollars)
Cost = 456 barriers [($250,000) + (37 year mean connection + 46 years)($2.5 k)] = $101,827,000 (today's dollars)
B:C = 3.84

Option 3
Benefit = 456 barriers (10-year mean connection + 146 years)($19,850) = $1,676,155,000 (today's dollars)
Cost = 456 barriers [($250,000) + (10 year mean connection + [illegible]$32,500)] + $849,600.00 (today's dollars)
B:C = 4.39

Option 4
Benefit = 456 barriers (4 year mean connection + 156 years) = $1,676,155,000 = $1,469,734,000 (today's dollars)
Cost = 456 barriers [($250,000) + (4 year mean connection + 156 years)($2,500)] = $491,680,000 (today's dollars)
B:C = 4.32

Memorandum of Agreement
Between
Washington State Department of Fish and Wildlife and Washington State Department of Transportation
Concerning
Construction or Placement of Hydraulic Projects
Chapter 82.70 RCW and Chapter 220-110 WAC
June 2007

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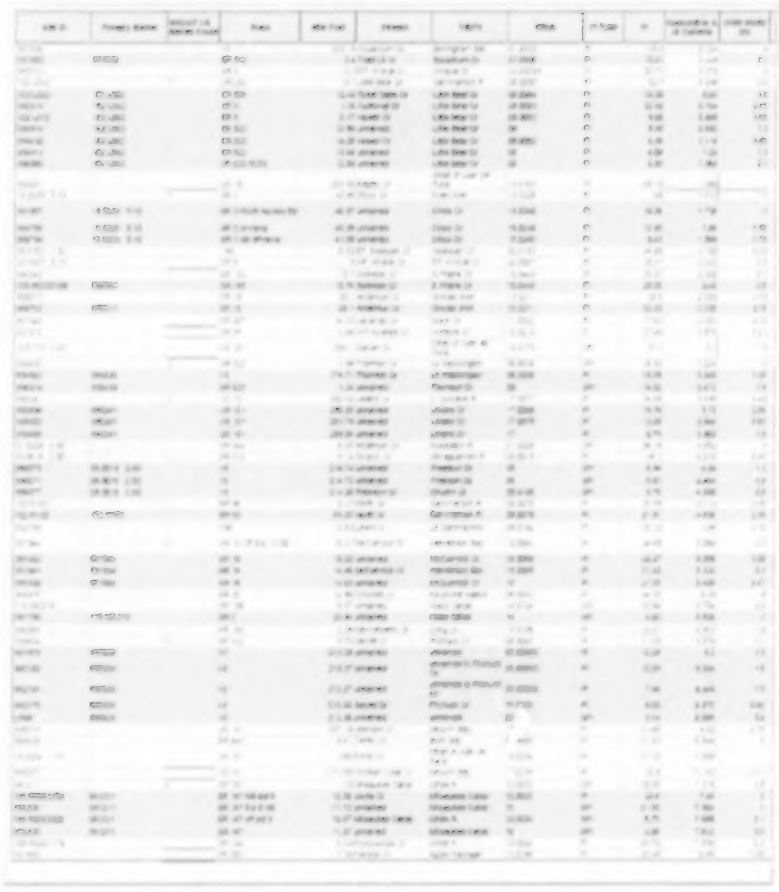
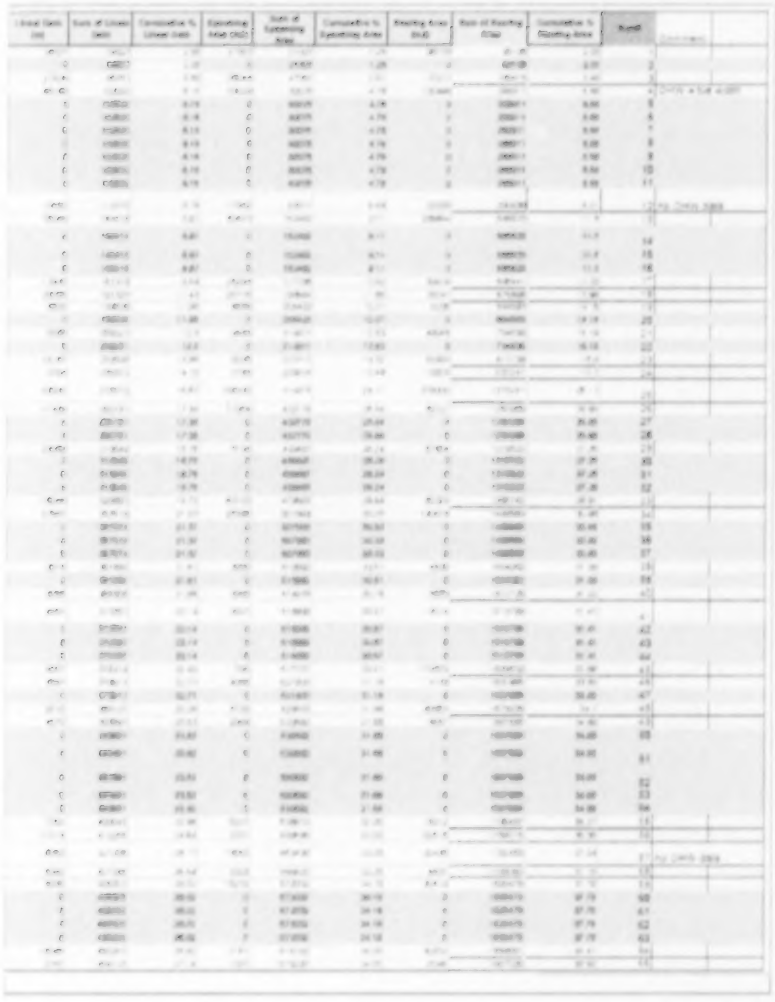
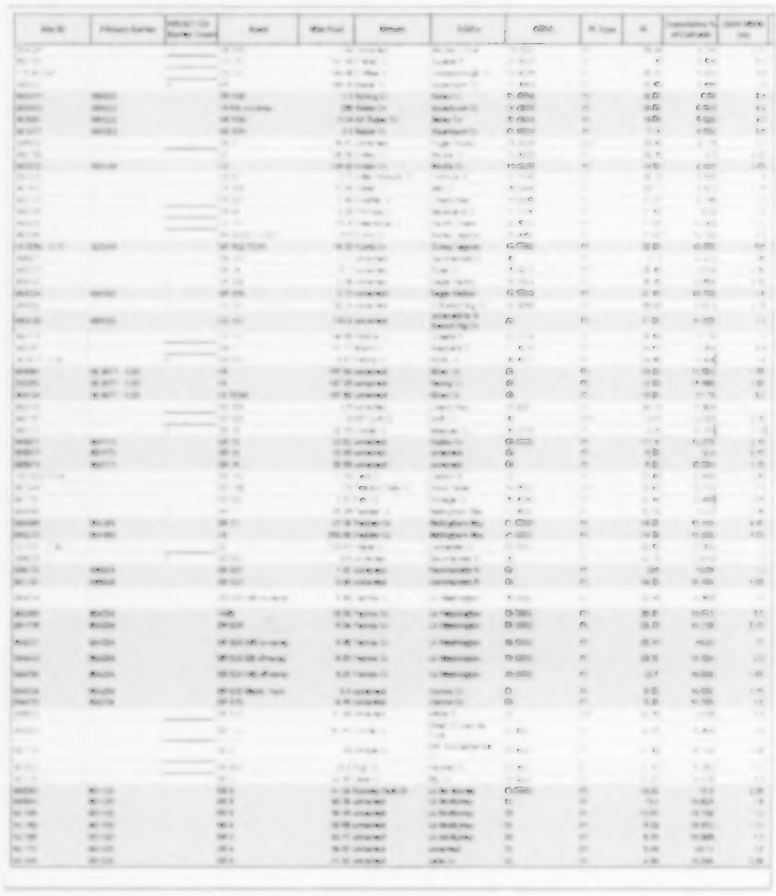
Appendix C: Fish Passage

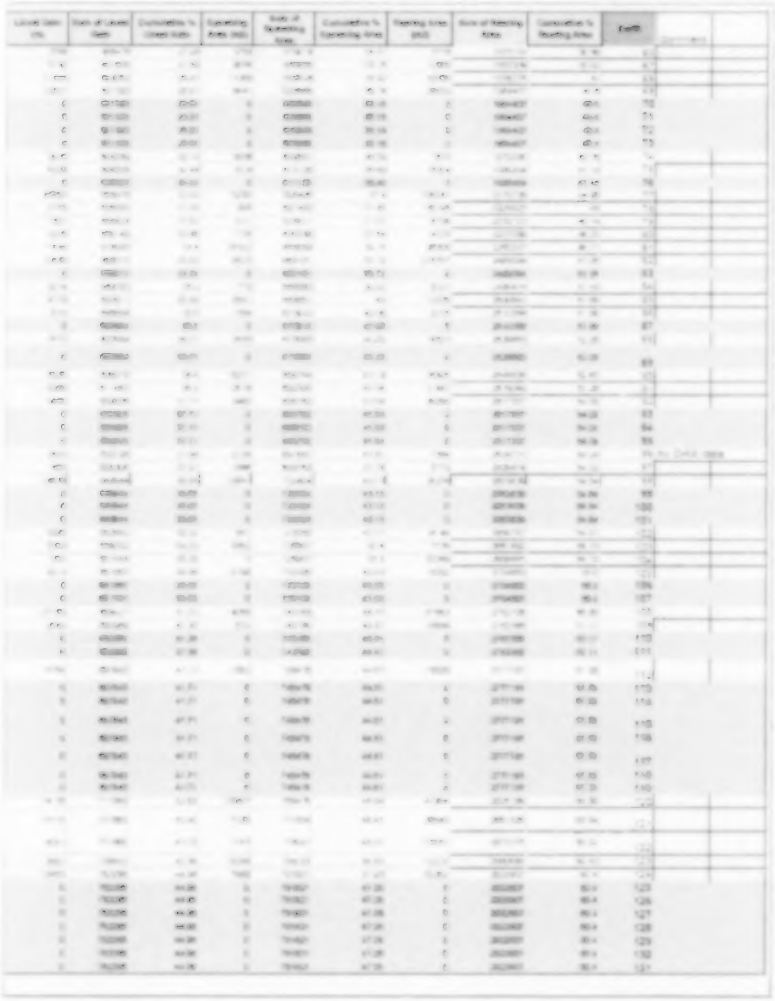
Table 1c. Ownership of Downstream Barriers Associated with Base Culverts

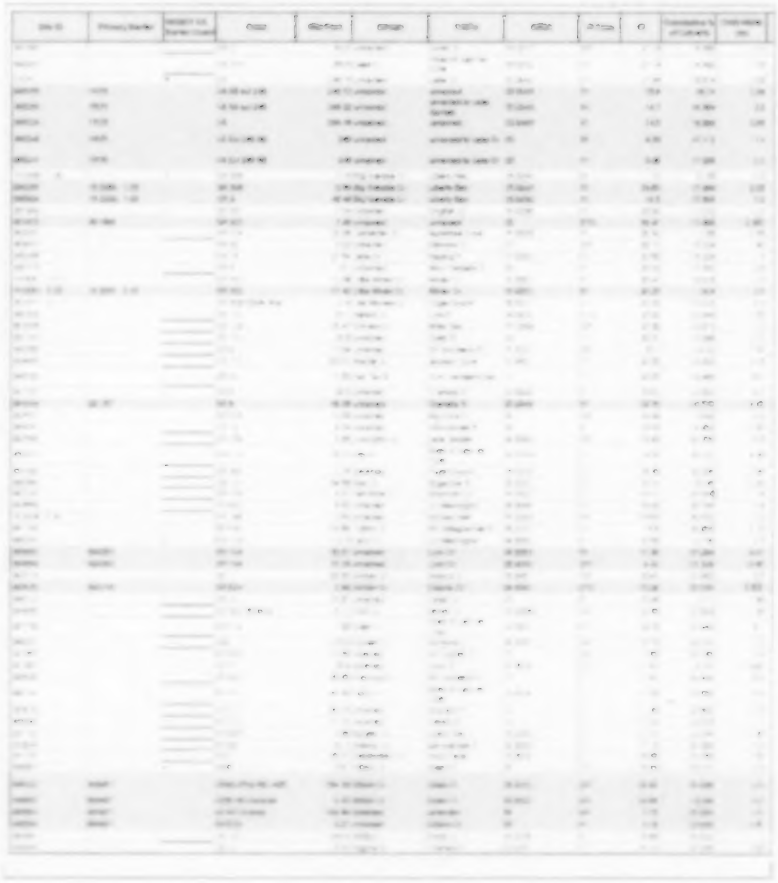
	Partial Barrier	*Total Barrier*	*Unknown Barrier*	*All Barriers*
State Owned Downstream Barriers	13 (9 culverts, 4 dams)	11 (10 dams, 1 misc barrier)	0	24
Non-State Owned Downstream Barriers on Floristana to be repaired by 2018	2 (culverts)	**2 (culverts)**	2 (culverts)	6
Non-State Owned Downstream Barriers not on Floristana	137 (107 culverts, 13 dams, 9 misc. barriers)	**52 (40 culverts/6 dams/6 misc. barriers)**	1(culvert)	190











Literal Sum (m)	Sum of Literal Sum	Cumulative % Literal Sum	Expanding Area (m2)	Sum of Expanding Area	Cumulative % Expanding Area	Reading Area (m2)	Sum of Reading Area	Cumulative % Reading Area	Rank		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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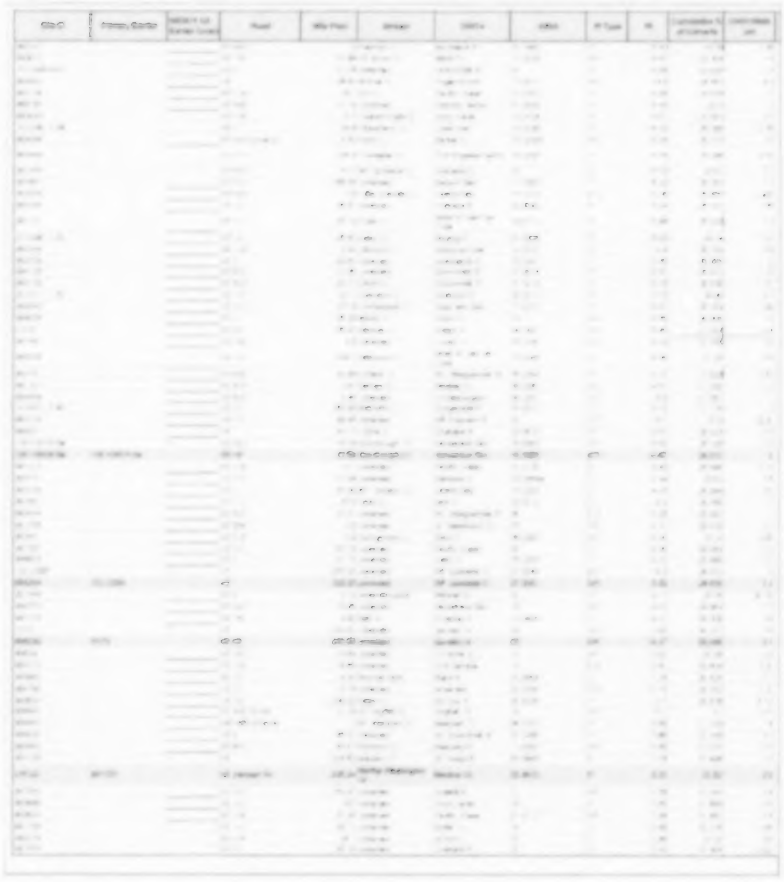

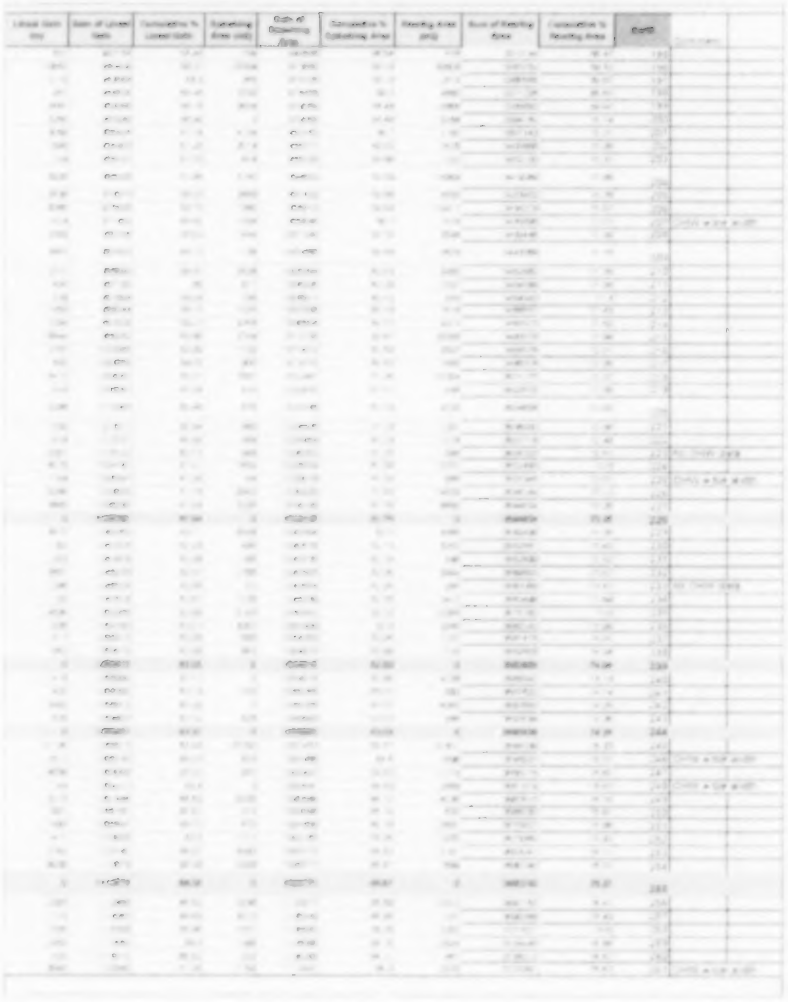

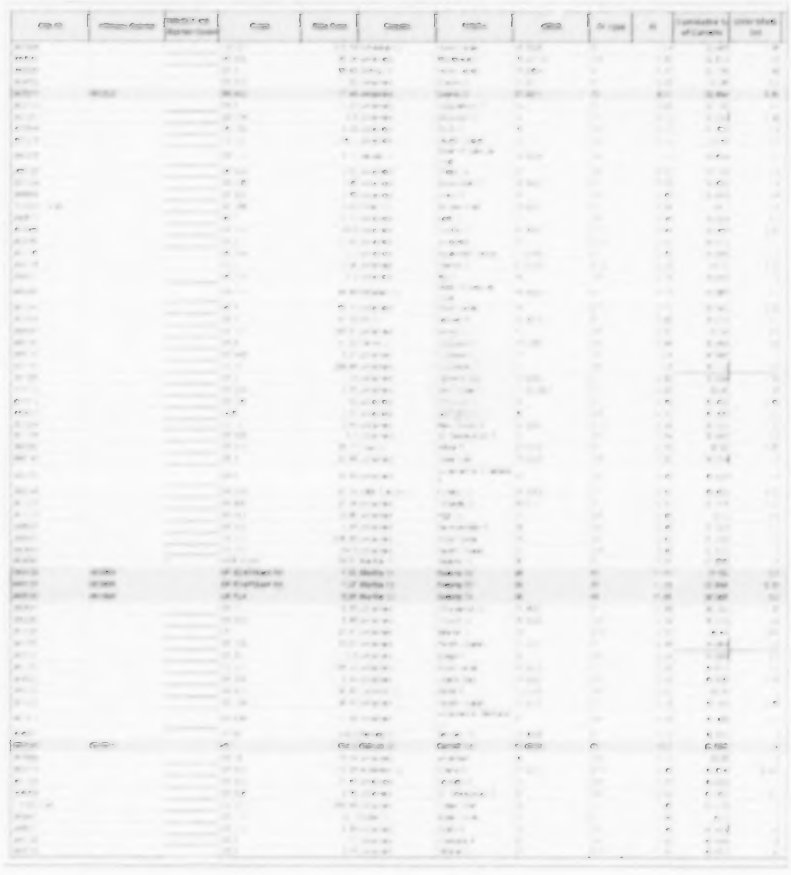

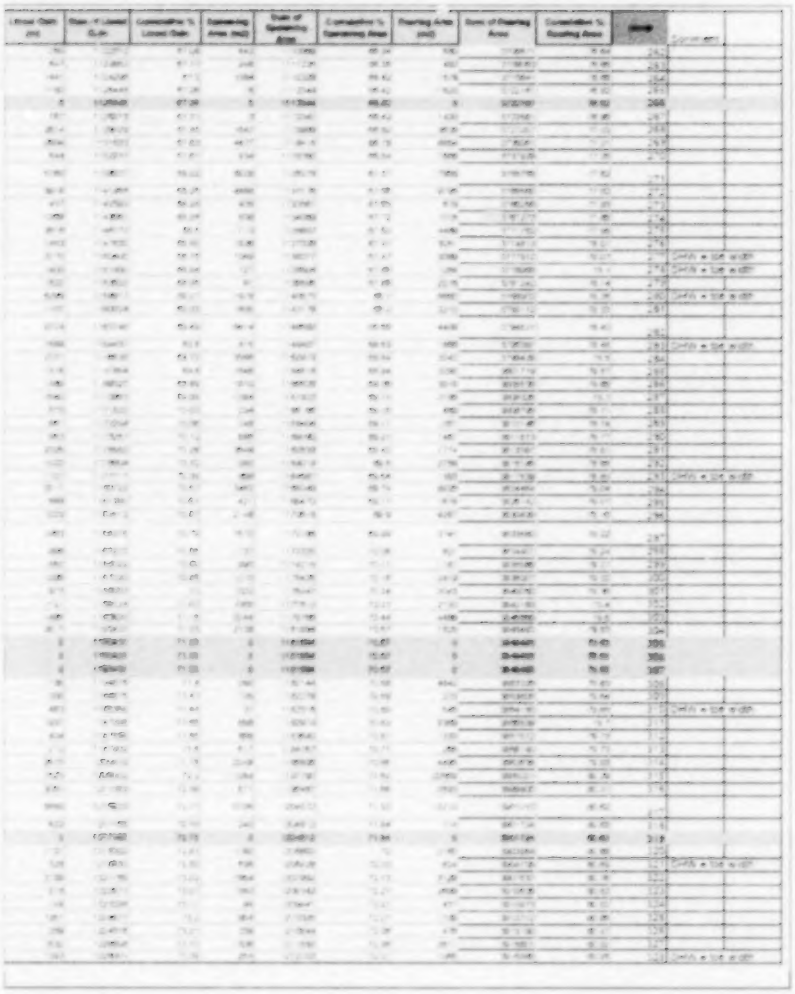

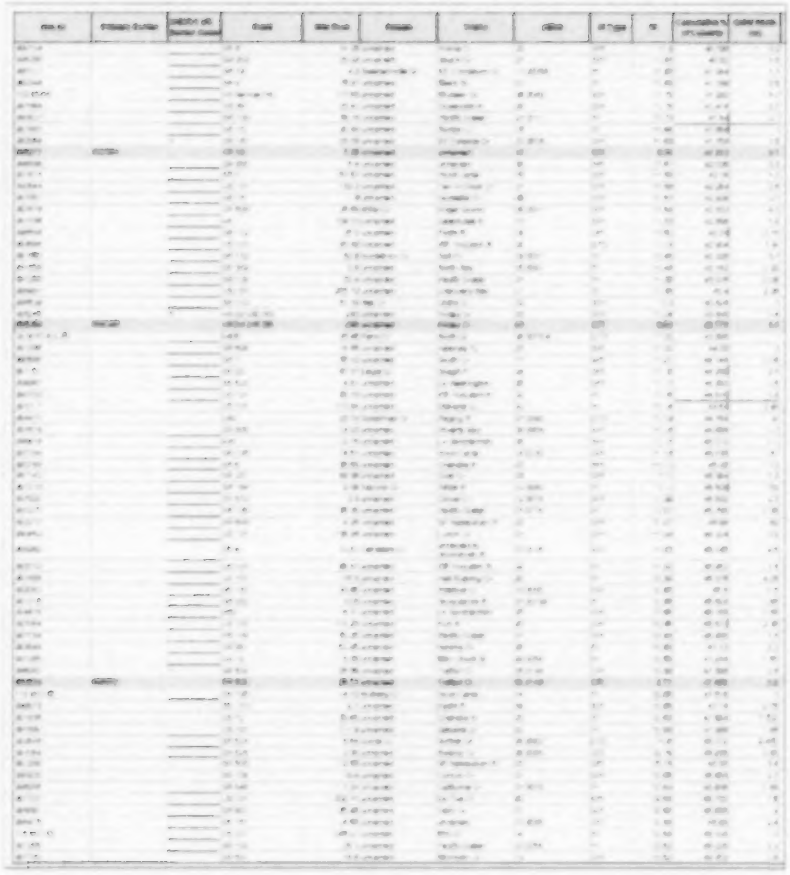

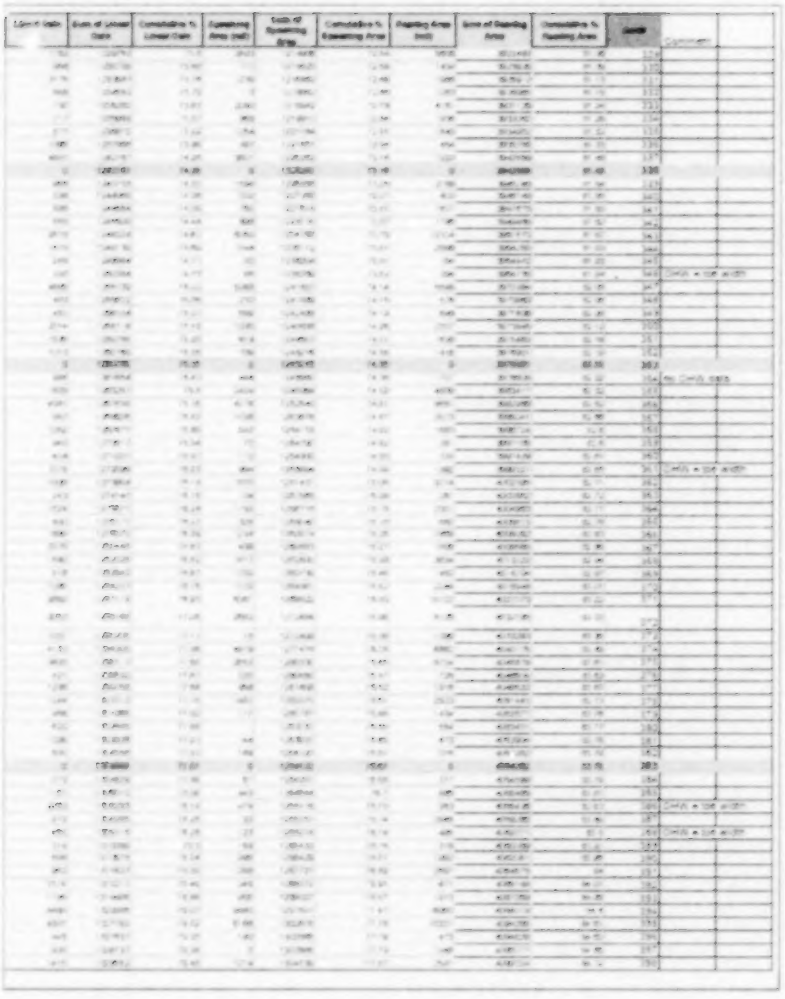

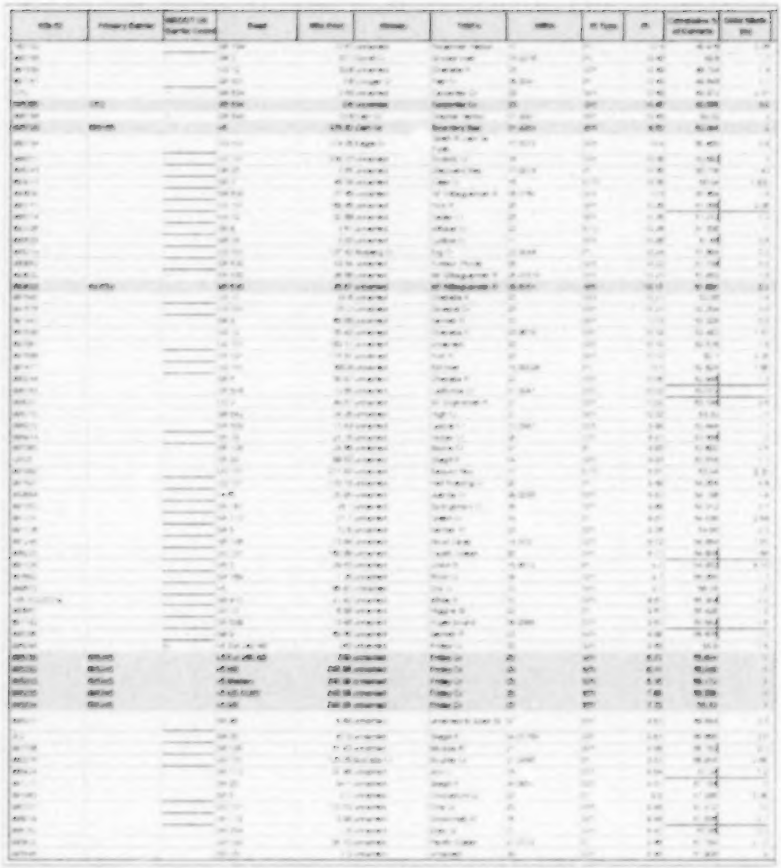

Lowest Gain (%)	Date of Lowest Gain	Cumulative % Lowest Gain	Appearing Area (m2)	Rank of Appearing Area	Cumulative % Appearing Area	Reaching Area (m2)	Sum of Gaining Area	Cumulative % Gaining Area	Rank	Comments	
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Site ID	Primary Barrier	Affiliation Department Domain Count	Road	Min Yield	Stream	Metric	Mill A	Pr Type	Pr	Commodity Unit Carbon	Other Earth Dec
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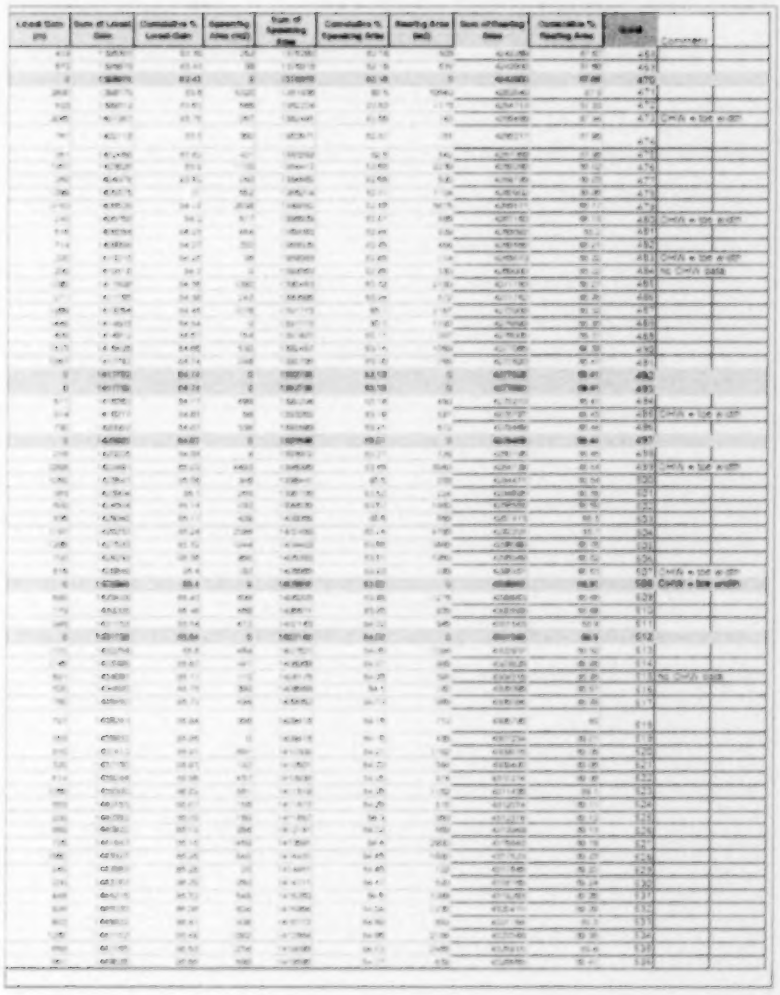

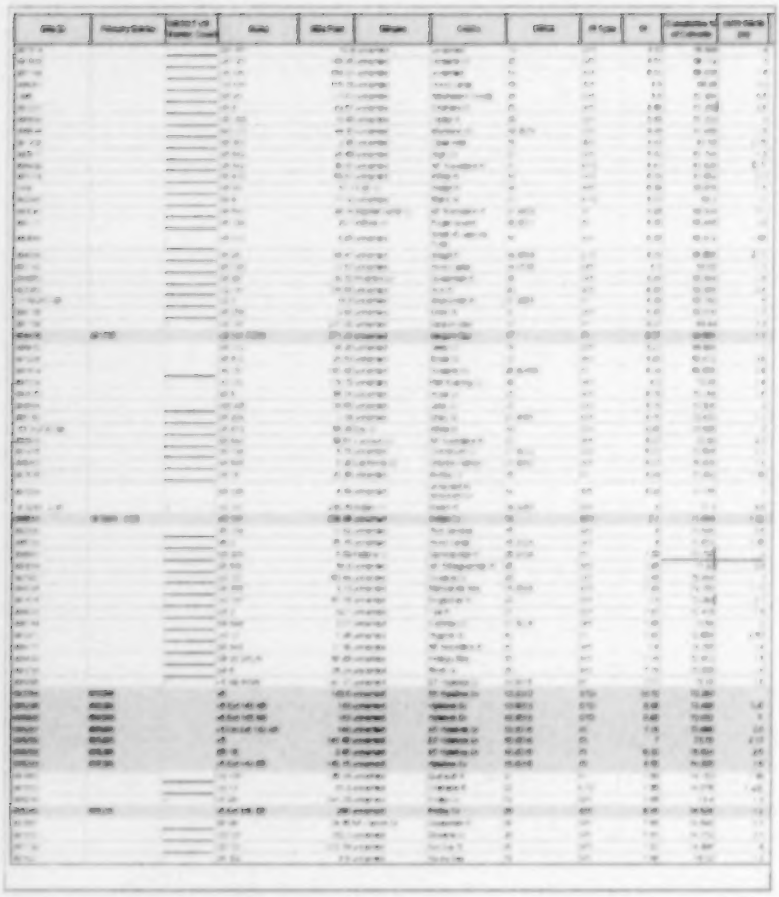

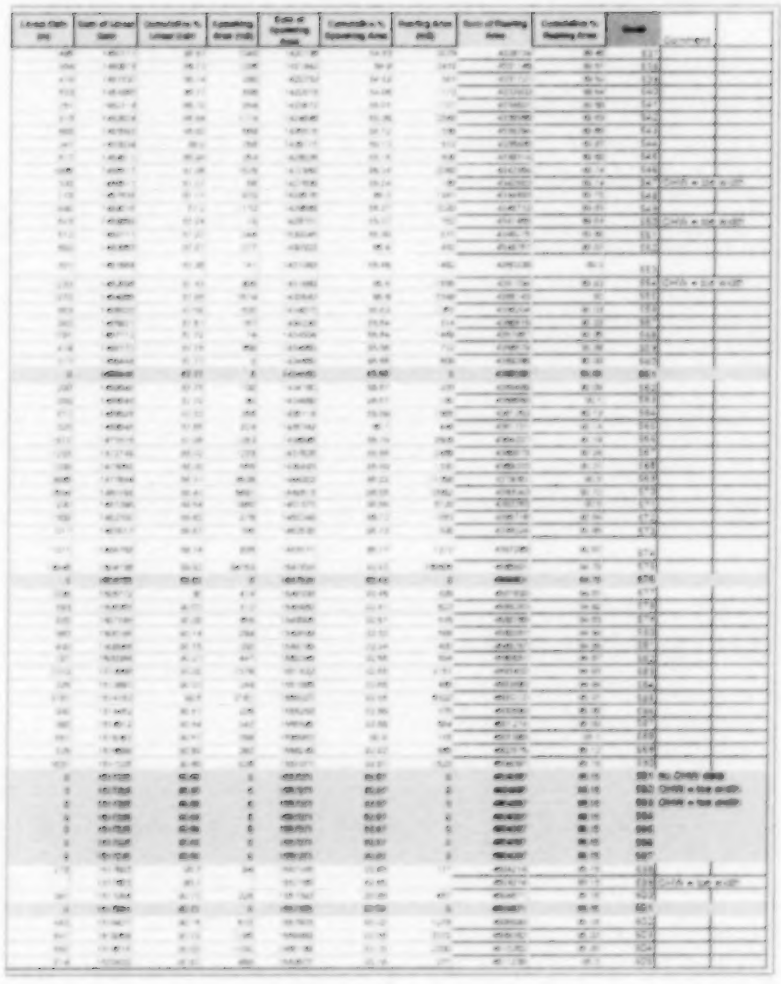

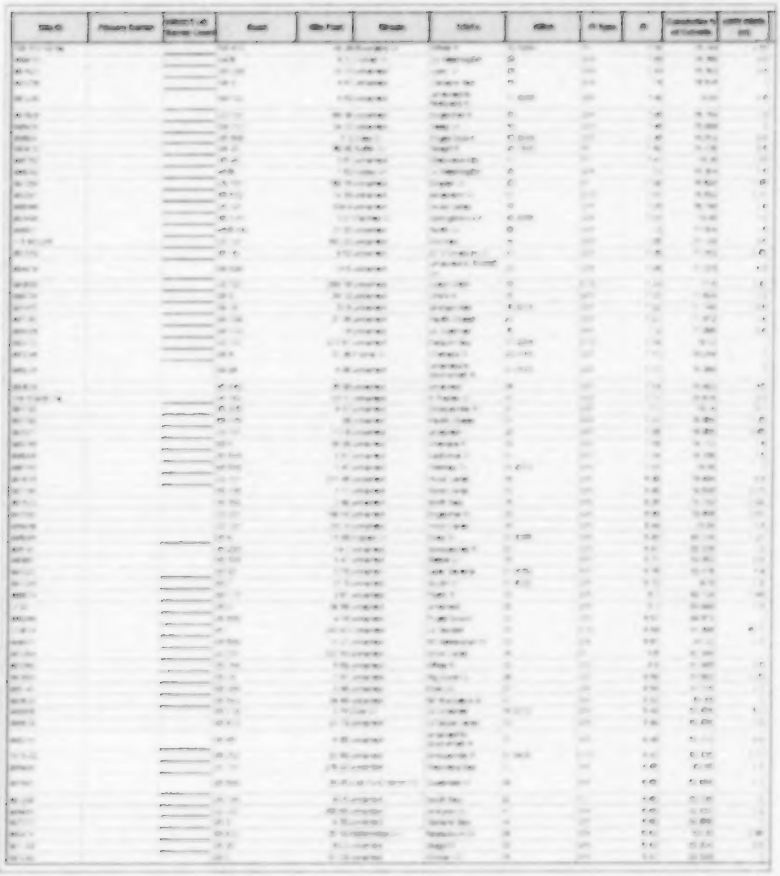

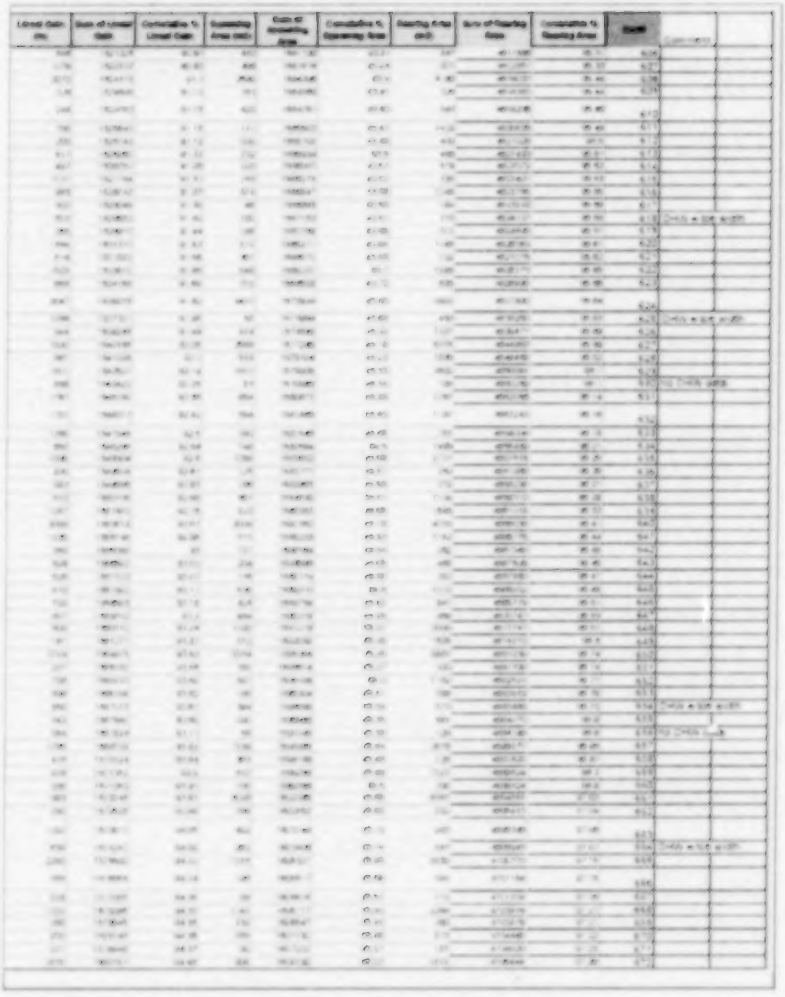

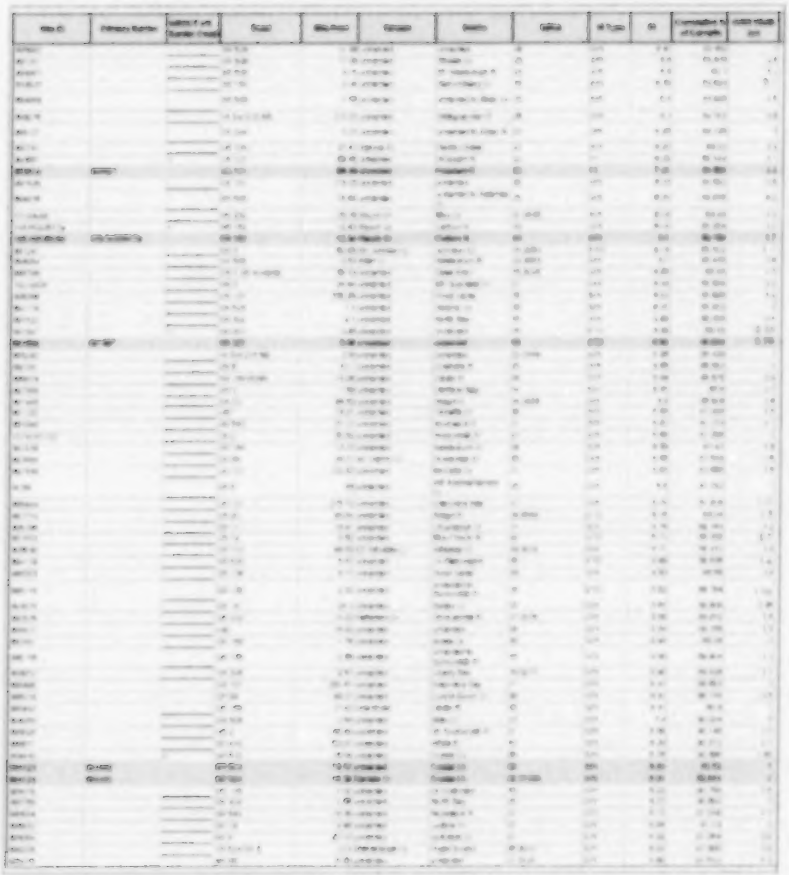

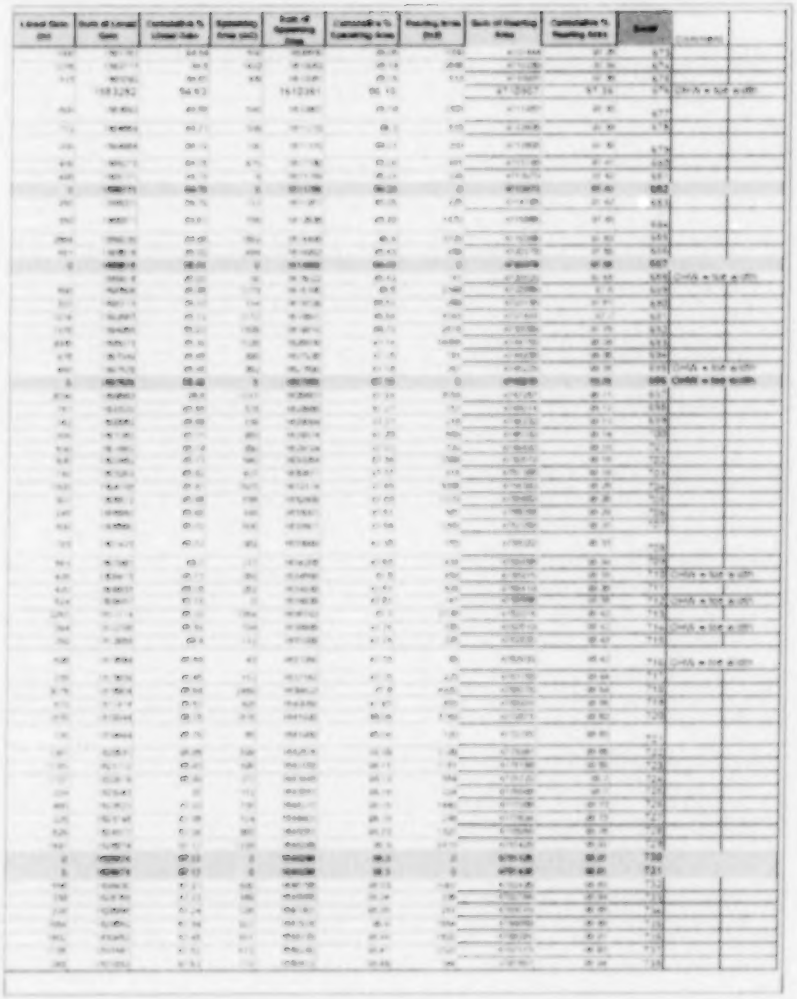

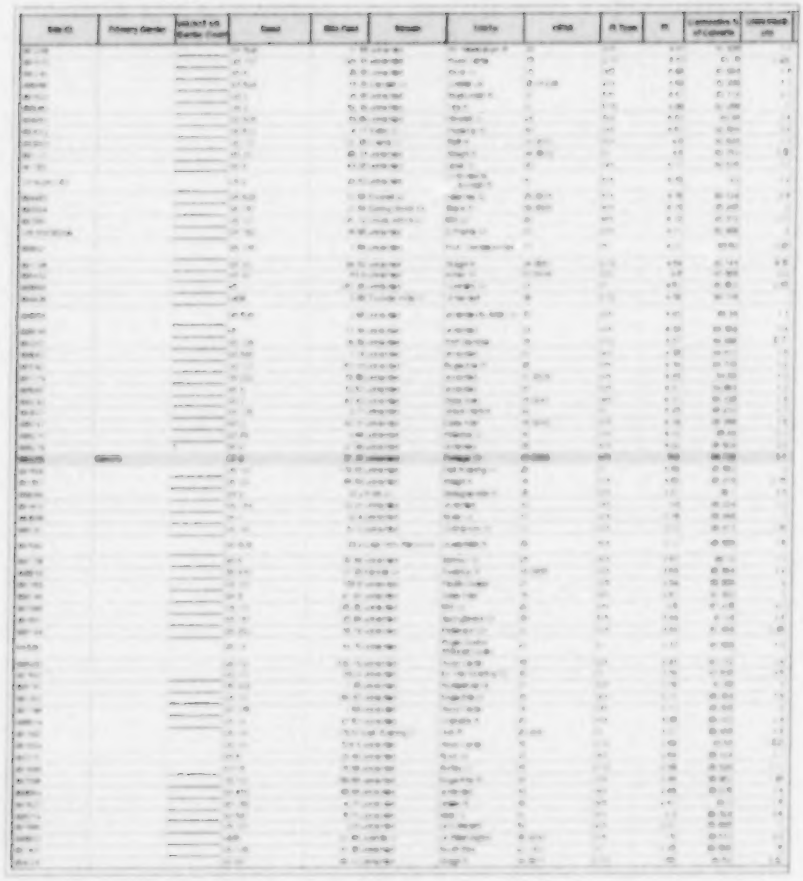

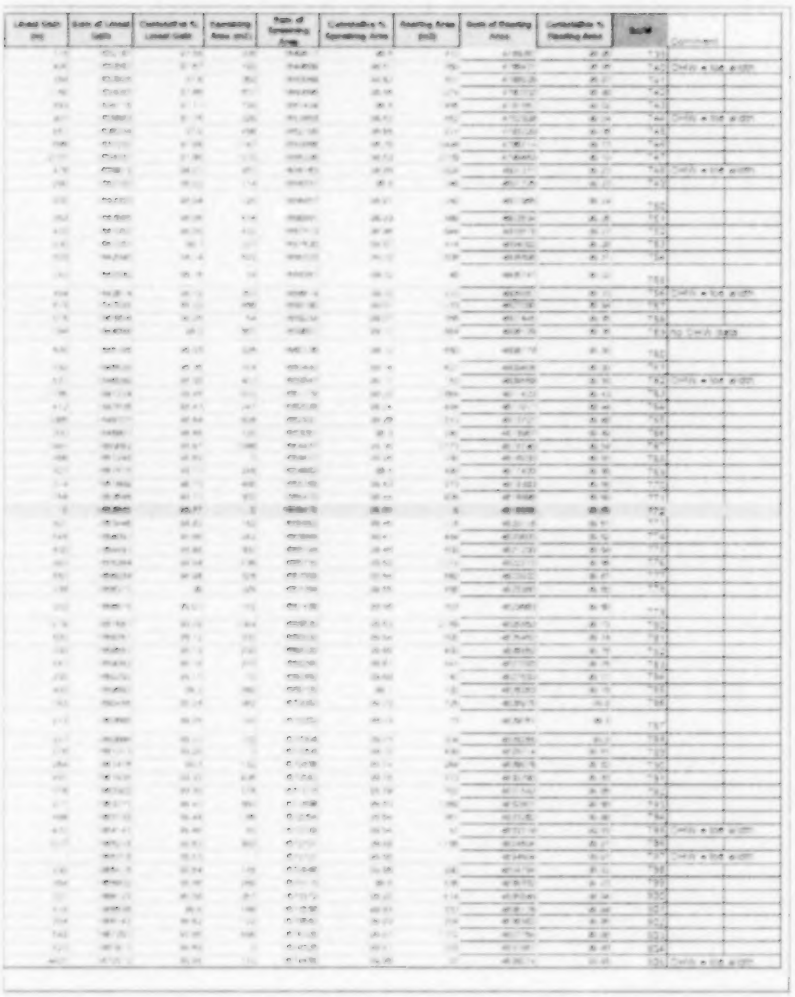

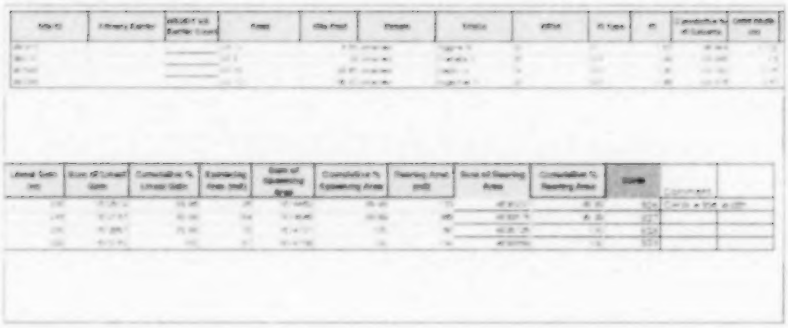

No. 17-269

In The
Supreme Court of the United States

STATE OF WASHINGTON,

Petitioner,

v.

UNITED STATES OF AMERICA, ET AL.

Respondents.

ON WRIT OF CERTIORARI
TO THE UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

JOINT APPENDIX – VOLUME III OF III

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PETITION FOR CERTIORARI FILED AUGUST 17, 2017
CERTIORARI GRANTED JANUARY 12, 2018

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THE HONORABLE RICARDO S. MARTINEZ

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF WESTERN WASHINGTON AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, vs. STATE OF WASHINGTON, et al., Defendants.	Case No.: 70-9213 Subproceeding No. 01-1 (Culverts) ***REVISED* DECLARATION (Oct. 13, 2009) OF PHILLIP A. MEYER REGARDING PRE-FILED, WRITTEN DIRECT TESTIMONY**

I, Philip A. Meyer, hereby declare as follows:

1. I am over the age of eighteen and am competent to testify on the matters set forth herein.

2. I hold a B.A. degree in Economics and Political Science from the University of British Columbia, and an M.A. in Resource Economics from the University of California, Santa Barbara. I have been employed as an economist for more than forty years, specializing in natural resource and particularly fisheries economics. I have previously been qualified as an expert witness and testified in several matters including the Shellfish Subproceeding in *United States v.*

Washington, Civil No. 9213, Sub. 89-3. A true copy of my *curriculum vitae* is attached to this declaration.

3. I was asked by counsel for Plaintiff Tribes in this sub-proceeding to testify as a witness son behalf of the Tribes. My direct testimony is in the form of a written report entitled "Estimation of Economic Benefits from Added Salmon and Steelhead Production in the State of Washington. A true and complete copy of my report is incorporated herein and constitutes testimony I would give in open court.

4. Attached and incorporated by reference herein is my revised report dated October 13, 2009, in lieu of direct testimony which report contains testimony I would give under oath if offered in open court.

I DECLARE under penalty of perjury that the foregoing is true and correct.

Executed this 13th day of October, 2009, at Victoria, Canada

By: _____
Philip A. Meyer

Estimated Marginal Net Economic Benefits Associated with Salmon and Steelhead in the State of Washington

A Report to:

MORISSET, SCHLOSSER & JOZWIAK

A Report by:

Philip A. Meyer

October 13, 2009

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Marginal Net Economic Benefits Associated with Salmon and Steelhead in the State of Washington

I. Introduction.

A 2008 report released by the Washington Department of Fish and Wildlife in December attributes $9.5 million annually in ex-vessel payments to Washington non-tribal commercial salmon fishermen[1], and net economic values of $129.4 million annually to recreational salmon fishers and $51.3 million to persons fishing recreationally for steelhead[2] in waters of Washington State.

[redacted]

REDACTED 10-15-2009 TRIAL TRANSCRIPT AT p. 97 (MEH)

Tribal values associated with returning salmon extend well beyond dollar returns to commercial fishing[3].

This report presents estimates of marginal[4] net economic benefits associated with salmon and steelhead stocks in the State of Washington only. The *marginal unit* utilized here for analysis is *one adult salmon or steelhead*. Extant an estimate of expected salmon returns to obtain an indication of scale, *existence/passive use* benefits are not incorporated in following sections of this report. Information on benefits to tribes – beyond those that would accrue from commercial fishing – is also not presented here.

[1] TWC Economics, 2008. **Economic Analysis of the Non-Treaty Commercial and Recreational Fisheries in Washington State. A Report for Washington Department of Fish and Wildlife**. p. 7.
[2] Supra at 14.
[redacted]

SEE ABOVE (MEH)

[3] See, for example: **Central Washington University, 1991. Potential Effects of OCS Oil and Gas Exploration and Development on Pacific Northwest Indian Tribes: Final Technical Report**. A Report to the U.S. Minerals Management Service. MMS 91-0056.
[4] In economics, "at the margin" means at the point where the last unit is added to or subtracted from production, or consumption.

II. Net Economic Revenue to Tribal and Non-Tribal Commercial Fishermen and Processors from Increased Returns of Salmon and Steelhead.

Assessment of *net economic value* associated with commercial salmon/steelhead harvesting and processing is the appropriate measure of economic impact from a national economic perspective.[8] *Net economic value* from increased commercial harvest and processing of salmon refers to the added money revenue gained by these activities, minus any additional associated costs.

Employment of otherwise unemployed labor resources is to be treated as a net economic benefit, not a cost[9], in such assessment. In applied terms, this requirement instructs that costs associated with labor, taken from a labor pool that is otherwise substantially and persistently unemployed, should not be deducted from net economic value[10].

This report follows federal guidelines, and calculates the net economic value for a commercially harvested salmon, based on procedure used in National Marine Fisheries Service et al. (2004).[11] The following steps are employed.

a. Estimate average price per salmon received by commercial fishermen.

b. Subtract any relevant associated fishermen cost to obtain net economic value at the fishermen level.

c. Apply a net value markup from the price received by fishermen to incorporate salmon processing in the calculation.

Prices per salmon in this analysis are obtained from the tribal component of the joint Washington State/ NWIFC commercial catch statistics data base – and represent averages for 2007/2008[12].

At the U.S. Decennial Census (2000), unemployment rates for case tribes were relatively high – ranging from 7 percent to 23 percent[13]. Overall, unemployment rates reported for Washington State residents were lower – but unemployment for the fishing sector was estimated above 20 percent in coastal counties[14].

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[8] U.S. Water Resources Council, 1983. **Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies**. Washington, D.C., U.S. Superintendent of Documents.

[9] **Supra** at 93.

[10] National Marine Fisheries Service, Puget Sound Tribes and Washington Department of Fish and Wildlife, 2004. **Puget Sound Chinook Harvest Resource Management Plan: Final Environmental Impact Statement**. Appendix D, Attachment C, p. 1

[11] **Supra**.

[12] Prices obtained by non-tribal commercial fishers may vary somewhat from those obtained by tribal fishers, according to gear employed and variant spot marion conditions.

[13] U.S. Bureau of the Census, 2004. **Characteristics of Individuals in a Specified American Indian Tribe – 2000**. STF-14. Census 2000 special tabulation.

[14] Wegge, Tom. 2003. *Estimated Unemployment Rates for Fishing Industry*. Cited to Washington State Employment Security Department, 2002, 2003. Email at August 29, 2003.

Washington State Employment Security Department identified the overall state unemployment rate increasing to 6.5 percent in 2008.[15] Present economic circumstances indicate that unemployment in the state (inclusive of the more adverse tribal and non-tribal fishing sectors) has increased further.[16]

Finally, NMFS et al (2004) employed a 100 percent markup for salmon from landed (ex-vessel) value through processing – and a reduction of 50% of this increment to allow for associated processing costs.[17]

Considering this information, it is concluded that the percentages applied to gross fishing revenue to obtain estimated *net economic value* by National Marine Fisheries, Tribes and the State of Washington in 2004[18] retain validity. These percentages will be used here (Table 1)[19] – expressed as a portion of the total value amount at respective fishing and processing stages.

Table 1

Net Economic Value Coefficients for Commercial Fisheries and Processing - Added Harvest of Salmon and Steelhead –

Measure	Net Economic Coefficient*	Economic Value (baseline = $1.00)
Gross Revenue Return to Fishing		1.00
Net Economic Return to Fishing	Gross fishing revenue x .94	.94
Net Economic Return to Processing	Gross fishing revenue x .50	.50
Net Economic Return to Fishing & Processing	Gross fishing revenue x 1.44	1.44

*The *net economic coefficient* represents the proportion of each dollar received by a fisher or processor that is counted as *net economic value* under the procedures discussed in this report. *Net economic values* at fishing and processing stages are additive.

Table 2 provides estimates of the net economic value per salmon accruing annually to Washington commercial fisheries and processors from additional harvest of salmon and steelhead. These values are obtained by applying average 2007/2008 prices for tribal

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[15] Washington State Employment Security Department, 2008. **2008 Washington State Labor Market and Economic Report**. p. 3.

[16] Washington State Employment Security Department, 2009. **Workforce Explorer: Washington**. January. Downloaded March 9.

[17] National Marine Fisheries Service et al. 2004. Supra. Appendix D, Attach. C, p. 8.

[18] Supra.

[19] The net economic coefficient for non-tribal commercial fishers has been increased slightly (by .04%) in this report, to conform to the tribal coefficient. This adjustment is consistent with final figures used by National Marine Fisheries Service et al. 2004.

inside and outside harvests – and modifying these results by the net economic value coefficients (Table 1).

Net economic values associated with further markup of salmon and steelhead revenues to retails levels are not included in this report. Such further value increments can be substantial.[20]

Table 2

Net Economic Value to Washington Commercial Fishers and Fish Processors from Return of One Additional Salmon or Steelhead

Species	Harvest Price Per Salmon	Net Economic Value Per Salmon – Fishing & Processing -
Chinook	$53.30	$76.75
Chum	6.50	9.36
Coho	14.90	21.46
Pink	.96	1.38
Sockeye	11.40	16.42
Steelhead	21.23	30.57

III. Net Economic Value Associated with Additional Sport Catch of a Salmon.

For several decades[21], estimates of *consumer's surplus* have been widely used to determine net economic value associated with goods and services.

> (Consumer's surplus) is a measure of the benefit to a consumer, net of the sacrifice he has to make, from being able to buy a commodity at a particular price. It is widely used in cost-benefit analysis and other areas of applied economics as an appropriate measure of changes in welfare... .[22]

The US Water Resources Council (1983) recommended that, where direct market prices for recreational goods and services were unavailable, *consumer's surplus* could be determined by two applied methods. The *travel cost* method counts the number of visitors to a given recreational site as a function of cost associated with distance and travel time. The second basic pricing method is via *contingent valuation survey*, which directly asks

---

[20] See, National Marine Fisheries Service, 2009. **Fisheries of the United States 2006**. Silver Spring, MD. U.S. Department of Commerce, pp. 38, 40.

[21] See, for example; Willig, Robert D., 1976. *Consumer's Surplus Without Apology*. in, **The American Economic Review**. September, pp.589-597.

[22] Pearce, David W., 1992. **The MIT Dictionary of Modern Economics** (4th edition). Cambridge, Mass: The MIT Press. p. 78.

respondents how much they would be *willing to pay* for changes in the quantity or quality of resources or of recreational opportunities[32, 34]

Where available researcher time and/or financial resources does not justify a field study to determine *consumer's surplus* via *travel cost* or *contingent valuation survey*, the Water Resources Council certified a third procedure – initially called the *unit day value method*, based on examination of prior empirical work and best expert judgment.[33] Such transfer of values from prior work continues to the present day – and is now commonly termed *benefit transfer analysis* by economists.

> Generally, nonmarket values are estimated through original research using methods such as the contingent valuation method or the travel cost method. The increasingly rich literature of valuation studies, combined with theoretical innovations, created the opportunity for less expensive and less time-consuming approaches to value estimation—a variety of techniques that can be described as benefit transfer.[35]

Given the time and financial resources available to this report, *benefit transfer analysis* is employed here. Two previous analyses are considered: National Marine Fisheries Service, Puget Sound Tribes and Washington Department of Fish and Wildlife (2004); and TCW Economics (2008)[37]. These two studies meet requisite "goodness of fit" criteria for transfer of value results – namely, they were done by recognized experts, and for federal/state agencies with fishery management responsibility in the waters of Washington State. Their reported results also provide data specific to salmonids.

National Marine Fisheries Service et al. (2004) estimated the *average net economic value of sport fishing in Puget Sound waters (including tributaries)* at $65 per angler day[38], expressed in Year-2000 dollars – based on earlier survey data from Olson et al., (1991)[39]. TCW Economics (2008) estimated a 2006 net economic value for sport fishing for salmon in Washington State of $58 per angler day[30] - based on a survey of prior salmon sport fishing studies in the Pacific region by Boyle et al. (1998)[31]. The lower TCW estimate of $58 per angler day is more recently published. It will be employed here.

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[32] US Water Resources Council, 1983. Supra at 67-83.

[34] For a more extensive treatment of scholarly discussion of *contingent value survey* methods, see: Mitchell, Robert C., and R.T. Carson, 1989. Using Surveys to Value Public Goods: The Contingent Value Method. Washington, D.C: Resources for the Future. The Johns Hopkins University Press.

[33] US Water Resources Council, 1983. Supra at §3-87.

[35] Allen, Byron P. and J.B. Loomis. *The decision to use benefit transfer or conduct original valuation research for benefit-cost and policy analysis*. in, Contemporary Economic Policy. 01-Jan-08.

[37] TCW Economics, 2008. Supra. p. 19.

[38] National Marine Fisheries Service et al., 2004. Supra at D-49.

[39] Olson, D., J. Richards and R.D. Scott, 1991. *Existence and Sport Values for Doubling the Size of Columbia Basin Salmon and Steelhead Runs*. Rivers. Vol. 1, No. 1, pp. 44-56.

[30] TCW Economics, 2008. Supra at 19.

[31] Boyle, Kevin, R. Bishop, J. Caudill, J. Charbonneau, D. Larson, M. Markowski, R. Unsworth, and R. Paterson, 1998. A Data Base of Sport Fishing Values. U.S. Fish and Wildlife Service. Economic Division.

Dividing aggregate "net economic value" figures for salmon and steelhead, reported in TCW Economics' Table 8, by recreational salmon and steelhead harvest figures from TCW's Table 6, yields an estimate of net economic value *per sport salmon* harvested (Table 3).

Table 3

Net Economic Value from an Added Sport Caught Salmonid

Species	Net Economic Value Per Fish
	—dollars per fish—
Salmon	$460.15
Steelhead	$470.73

IV. Present Value from an Additional Salmon or Steelhead Returning to Washington State – Summed Over 50 and 100 Years.

The average annual net economic benefit from an additional adult salmonid returning to Washington State is expected to accrue, year after year, over future time. Standard practice requires economists to sum such annual benefits over a future period of up to 100 years[12]. For this analysis, such summed values are reported for periods of 50 and 100 years into the future.

Economists note that benefits accruing in the future may not be assigned equivalent value with those accruing at present – either because persons may prefer to consume goods or services "now" rather than "later" (social time preference), or because presently available funds could be invested to earn a future economic return (rate of return on capital). Consequently, economists progressively reduce weightings applied to annual estimated net economic value over each future year by use of a real rate of discount[13] - and then sum these discounted annual values to obtain an estimate of the *total present value* of benefits received.

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[12] US Water Resources Council, 1983. Supra at 5.

[13] *Real discount rates* discount the value of benefits received in future years, minus any effects from expected future inflation.

Issues associated with selection of an appropriate discount rate have been extensively discussed in Lind, et al. (1982)[34]; and by Hartman (1990)[35], Lind (1990)[36], Lyon (1990)[37] and Moore and Viscusi (1990)[38]. Charles Howe, chair of the special JREAM (1990) session on discounting[39] summarized consensus from the four papers.

> Under current U.S. conditions, a real rate (of discount) of about 2% seems to have support...[40]

In analyses such as this, where benefits are expected to accrue well into the future:

> The government's long term borrowing rate is a good first candidate for the discount rate in long-term intergenerational allocation problems.[41]

The U.S. Office of Management and Budget, in their circular of December, 2008, recommend use of a real discount rate of 2.7% for future annual benefits lasting thirty years or more.[42]. That rate is employed here to estimate the discounted present value of benefits accruing to fishers, fish processors and to Washington State residents in general, from an added returning salmon and steelheads – summed over 50 years and 100 years, respectively (Table 4).

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[34] Lind, Robert C., K.J. Arrow, G.B. Corey, P. Dasgupta, A.K. Sen, T. Stauffer, J.E. Stiglitz, J.A. Stockfish and R. Wilson, 1982. **Discounting for Time and Risk in Energy Policy**. Resources for the Future. Washington, D.C.: John Hopkins Press.

[35] Hartman, Robert W., 1990. *One Thousand Points of Light Seeking a Number: A Case Study of CBO's Search for a Discount Rate Policy*, in, **Journal of Environmental Economics and Management**, 18, S-3 to S-7.

[36] Lind, Robert C. 1990. *Reassessing the Government's Discount Rate Policy in Light of New Theory and Data in a World Economy with a High Degree of Capital Mobility*, in, **Journal of Environmental Economics and Management**, 18, S-8 to S-28.

[37] Lyon, Randolph M., 1990. *Federal Discount Rate Policy, the Shadow Price of Capital, and Challenges for Reforms*, in, **Journal of Environmental Economics and Management**, 18, S-29 to S-50.

[38] Moore, Michael J. and W.K. Viscusi, 1990. *Discounting Environmental Health Risks: New Evidence and Policy Implications*, in, **Journal of Environmental Economics and Management**. 18, S-51 to S-62.

[39] Notes 44 through 47.

[40] Howe, Charles C., 1990. *Introduction: The Social Discount Rate*, in, **Journal of Environmental Economics and Management**, 18, S-2.

[41] Lind, Robert C., 1990. Supra at S-24.

[42] Executive Office of the President, 2008. **2009 Discount Rates for OMB Circular No. A-94**. Office of Management and Budget. December 12.

Table 4

Present Value of Salmon-Related Benefits from an Additional Salmon or Steelhead Returning to Washington State Each Year - Summed Over 50 and 100 Years at a Real Discount Rate of 2.7% -

Beneficiary	Annual Net Benefit Per Fish	Total - 50 Years	Total - 100 Years
	---$---	---$---	---$---
Commercial Fishers & Processors:			
: Chinook	53.30	1,492	1,886
: Chum	6.50	182	230
: Coho	14.90	417	517
: Pink	.96	27	34
: Sockeye	11.40	319	403
: Steelhead	21.23	594	751
Sport Fishers:			
: Salmon	460.15	12,883	16,284
: Steelhead	470.73	13,180	16,658

V. References.

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Executive Office of the President, 2008. **2009 Discount Rates for OMB Circular No. A-94**. Washington, D.C: Office of Management and Budget. December 12.

Hartman, Robert W., 1990. *One Thousand Points of Light Seeking a Number: A Case Study of CBO's Search for a Discount Rate Policy*, in, **Journal of Environmental Economics and Management**, 18, S-3 to S-7.

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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF WESTERN WASHINGTON AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiffs, vs. STATE OF WASHINGTON, et al., Defendants.	Case No.: 70-9213 Subproceeding No. 01-1 (Culverts) ***REVISED* DECLARATION (Oct. 13, 2009) OF KIT RAWSON IN LIEU OF DIRECT TESTIMONY** 28 U.S.C. § 1746

I, KIT RAWSON, hereby declare as follows:

1. I am the senior fishery management biologist for the Tulalip Tribes and have been a harvest management biologist for the Tulalip Tribes since 1986 and make this declaration in that capacity.

2. I have a Bachelor of Science degree in biological sciences from the University of Arizona (1975) and a Master of Science degree in biomathematics from the University of Washington (1980).

3. Prior to my employment with Tulalip I was a fisheries biometrician with the Alaska Department of Fish and Game for five years. I was a member of the Pacific Fishery Management Council's Scientific and Statistical Committee from 1991-1998. I was a member of the Puget Sound Technical Recovery Team from 2000 to 2007 and now am on the successor Puget Sound Recovery Implementation Technical Team. I am a Certified Fisheries Scientist with the American Fisheries Society.

4. I have been previously qualified as an expert witness and have testified on a number of occasions in *United States v. Washington*, both through live testimony and through affidavits and declarations.

5. Attached and incorporated by reference herein is my revised report dated October 13, 2009, in lieu of direct testimony which report contains testimony I would give under oath if offered in open court.

I DECLARE under penalty of perjury that the foregoing is true and correct.

Executed this 13th day of October, 2009, at The Tulalip Reservation, Washington.

By: Kit Rawson
Kit Rawson

UNITED STATES V. WASHINGTON - CAUSE NO. 9213 - SUBPROCEEDING 01-1
(CULVERT CASE)

WRITTEN REPORT AND DIRECT TESTIMONY OF KIT RAWSON
APRIL 3, 2009 TO ACCOMPANY DECLARATION OF APRIL 3, 2009
REVISED OCTOBER 13, 2009

1. Current status of Pacific salmon in the Puget Sound region

The rivers entering the greater Puget Sound region, including Puget Sound proper, Admiralty Inlet, the Whidbey Basin, and the United States side of southern Georgia Strait, the San Juan Islands, the Strait of Juan de Fuca supports six species of the genus *Oncorhynchus*, five species of Pacific salmon, plus steelhead. (Table 1).

Table 1. Species of Pacific salmon and steelhead (*Oncorhynchus* spp.) in Puget Sound with summaries of status under the Endangered Species Act (ESA) and the Salmon and Steelhead Stock Inventory (SASSI).

		ESA Status		SASSI Status			
Common name	**Scientific name**	**Number of ESUs[a]**	**Number endangered, threatened, or of concern[a]**	**Number of stocks[b]**	**Number of stocks rated[b,c]**	**Number of stocks rated as depressed or critical status[b]**	**(%)[d]**
Chinook salmon	*O. tshawytscha*	1	1	29	22	12	(55%)
Chum salmon	*O. keta*	2	1	55	42	3	(7%)
Coho salmon	*O. kisutch*	1	1	46	37	17	(46%)
Pink salmon	*O. gorbuscha*	2	0	15	13	4	(31%)
Sockeye salmon	*O. nerka*	1	0	4	4	4	(100%)
Steelhead trout	*O. mykiss*	1	1	60	31	15	(48%)
Overall		8	4	209	149	55	(37%)

[a] This counts ESUs with spawning grounds wholly or partially within the greater Puget Sound region. See http://www.nwr.noaa.gov/ESA-Salmon-Listings/.

[b] See http://wdfw.wa.gov/fish/sasi/sasi97.pdf

[c] Unrated stocks were classified as "unknown" status due to lack of sufficient information to make the assessment.

[d] Percent of rated SASSI stocks that were in depressed or critical status.

I will discuss the current status of these species as related to what we can say about how their current status compares with their condition in a time before major impacts to habitat from converting land from forest to farms and cities, modification of shorelines, introduction of pollutants, modification of streamflow patterns, and blockages of access to habitat from dams and culverts.

A broad overview of salmon status is provided in the comprehensive review undertaken by the National Oceanic and Atmospheric Administration, Fisheries Division (NOAA Fisheries) in the late 1990s, for carrying out their mandates under the Endangered Species Act (ESA). They classified the Pacific salmon in Puget Sound into 8 evolutionarily significant units (ESU) [1], of which 4, or 50% are listed as endangered or threatened, or classified as "of concern" (Table 1)[2].

A more detailed assessment of Puget Sound salmon status is in the comanagers' (State of Washington and the treaty tribes) review of the status of all Washington salmon and steelhead in 1993. This analysis, in which I participated, resulted in a report called the Salmon and Steelhead Stock Inventory (SASSI[3]). The first step used available information on geographic location of spawning aggregations, average fish size, age structure, migration timing, and genetics to divide the species into stocks, or separate breeding populations. Pacific salmon biologists consider the stock to be the appropriate unit for conservation and for evaluating the status of a species. Those of us working on SASSI identified 209 stocks this way for all six species in the Puget Sound region (Table 1).

Our next step was to examine available information on trends in abundance and productivity to classify each of the stocks as "healthy", "depressed", or "critical." We classified a number of the stocks, lacking reliable abundance trend information, as "unknown" status. We assigned depressed status to stocks that are producing below levels that would normally be expected and critical status to stocks that are so low in abundance as to be biologically impaired by that fact alone. Although this isn't exactly the same thing, it is similar to an assessment that a group of fish may by threatened with or in danger of extinction. Of 149 Pacific salmon stocks in Puget Sound whose status we rated, 55, or 37% were either depressed or critical; of 22 rated Chinook salmon stocks, 55% were in these categories; of 37 rated coho salmon stocks, 46% were in these categories; and of 31 rated steelhead trout stocks, 48% were in these categories (Table 1).

Chinook, coho, and steelhead, the three species that most depend on a long period of rearing in freshwater streams and rivers[4], have the highest fraction of depressed and critical stocks in the SASSI analysis, with 49% of 90 rated stocks being either depressed or critical. Chum, pink, and sockeye, on the other hand, which do not require significant stream and

[1] The ESU is, for Pacific salmon, the equivalent of a "species" under the ESA and is the basic unit that is classified as endangered, threatened, or of concern.
[2] Of 52 ESUs on the entire west coast from Washington to California, 27 are now listed as threatened or endangered.
[3] http://wdfw.wa.gov/fish/sassi/sassi92.pdf
[4] C. Groot and G. Margolis (eds.). 1991. Pacific salmon life histories. University of British Columbia Press, Vancouver.

river rearing habitat[5] have 59 rated stocks in the Puget Sound region, of which we only rated 19% as depressed or critical.

By definition, and as will become clearer in the discussion of harvest management below, the SASSI depressed and critical stocks, and the ESA listed ESUs, are not able to provide direct fishery benefits from natural production at any level, or only at levels much less than what they likely provided under more pristine conditions of habitat. SASSI critical stocks and ESA-listed ESUs, in particular, must be managed with a primary goal of preventing further impairment or extinction. Although a combination of actions in the areas of harvest management, hatchery production, habitat protection, and habitat restoration is necessary for full recovery of salmon stocks, harvest management actions are typically the first and sometimes the only actions undertaken for conservation of depressed and critical stocks. But harvest reductions alone are not sufficient to increase salmon production, as recent experience shows. Lost habitat must be restored, and currently productive habitat protected, if these harvest reductions are to result in improved salmon production.

In SASSI, we classified the remaining rated stocks as healthy, but this classification is associated in the report with a strong caveat that "healthy" does not imply that these stocks are performing at levels similar to what they likely did under conditions of pristine habitat. In fact the report states "...if a stock status were rated against pristine habitat, every stock could be rated depressed or worse."[6] In fact, salmon biologists consider most naturally produced Chinook stocks in Puget Sound, whatever their SASSI rating, to be at abundances of between 10% and 25% of historical, pre-development, levels. This assessment is based on modeling of the relationship of habitat condition to Chinook salmon production for stocks throughout Puget Sound using the Ecosystem Diagnosis and Treatment (EDT) model[7]. There is no similar comprehensive analysis available comparing current status with pre-development status for other Pacific salmon species throughout Puget Sound. However, it is likely that natural production coho and steelhead stocks, at least, are currently at abundances well below historic levels, no matter what their SASSI status is.

It should also be noted that the majority of returning adult Chinook, coho, and steelhead in Puget Sound today are artificially produced at hatcheries, mainly to provide some fishing opportunity in the face of declining natural production. Although fishery managers undertake extensive monitoring and research to distinguish hatchery production from natural production, some fraction of the salmon identified as natural production are in fact derived from hatcheries and wouldn't be there if the hatcheries weren't producing fish. Thus, it is likely that the assessments of the current status of these species err on the

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[5] Sockeye salmon require lake rearing habitat but do not normally require significant stream rearing habitat. However, there are some sockeye in Puget Sound rivers that are not apparently associated with lakes. See Groot and Margolis 1991

[6] SASSI, p. 28

[7] The use of the EDT analysis to estimate historic production and recovery goals, and to compare these with current production for Puget Sound Chinook salmon, is documented in a report from the Puget Sound Technical Recovery Team: Rawson, K., K. P. Currens, R. Fuerstenberg, W. H. Graeber, M. H. Rockhoust, N. J. Sands, J. B. Scott. *In prep.* Combining demographic and habitat-based approaches to triangulate on viability criteria for Puget Sound Chinook salmon populations, December 16, 2004

optimistic side, and, the actual condition of natural production is worse than these assessments suggest. Also, the SASSI analysis was based on conditions more than 16 years ago in 1992. If state and tribal biologists repeated the SASSI classifications today, the statistics, at least for Chinook, coho, and steelhead, would likely indicate a more degraded resource.

2. Causes of the decline in status

Scientists and planners working on salmon recovery usually group the human-caused factors causing natural production salmon stocks to be in a degraded state into three areas: harvest, hatcheries, and habitat[8]. Other factors, such as ocean conditions, also affect the status of salmon stocks. I will address each of these in turn and then discuss how, in combination, they result in the current degraded status we see for many stocks.

Harvest

The state's and tribes' current approach to salmon harvest management is covered in detail in a later section. In general, harvest controls are implemented to assure that sufficient fish pass through to spawning areas so that the runs will continue to survive at a high enough level to provide future harvest. Appropriate harvest numbers or rates[9] for natural production fish depend on the abundance of the return in a given year and the expected productivity[10] of the fish allowed to spawn.

Salmon management biologists usually predict both abundance and productivity using statistical relationships necessarily developed from data collected for some number of years extending into the past. Error in forecasts is introduced due to the intrinsic variability of salmon populations and variability caused by not taking into account all of the factors that affect abundance and productivity. Besides variability, a bias, or a tendency to forecast too high or too low, can occur if the basic production regime has changed since the time the data underlying the statistical relationships underlying the forecasts were collected. This situation could occur if the amount or quality of habitat has changed, and is especially prevalent for the analyses underlying the harvest management guidelines (minimum escapement numbers or maximum harvest rates) because those analyses are usually only completed infrequently and thus are based on older data.

In addition to errors and uncertainty in forecasting abundance and productivity, there are errors in actually implementing a harvest management plan, i.e. harvesting a particular number or fraction of fish from a particular stock. These errors are mainly caused by uncertainty of stock origin in a particular fishery (most salmon fisheries harvest a mixture of several to many stocks) and uncertainty in the prediction of the number of fish that will be harvested (or otherwise killed such as by being caught and released) in response to a particular fishing regulation.

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[8] Sometimes these are called "the 4 H's" with hydroelectric facilities added as fourth area. For Puget Sound work, however, the effects of hydroelectric dams are usually considered as part of "habitat".
[9] i.e. the fraction of the population that may be harvested
[10] i.e. number of fish in a future generation produced per spawning adult in the generation

Despite the opportunity for errors at many points, salmon harvest management has generally been successful in the Case Area for at least the past couple of decades. Managers track many fisheries closely as they occur, use information from the fishery to update estimates of abundance, use sophisticated techniques to assess the stock composition in fisheries, adjust openings by time and area, and change fishing plans during the season in response to real time information. Recently, when faced with uncertainty, managers have started to use risk-averse, precautionary approaches to setting fishing plans, especially when they lack the ability to adjust a fishery during the fishing season for some reason.

As a result of the above, natural escapement numbers for many stocks in Puget Sound have been higher in recent years than the several decades before that. For example, the year 2001 saw the highest Chinook salmon spawning escapement for the Snohomish River since the beginning of the database in 1965, and 2008 saw the second highest level (Fig. 1). The 4-year moving average Snohomish Chinook escapement has been consistently above 6,000 fish since 2001 and below that level in all but one year from 1965 to 2000 (Fig. 1). There is a similar pattern for Chinook escapement in the Skagit and other Puget Sound rivers.

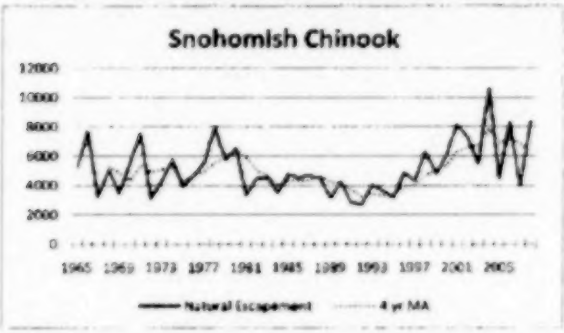

Figure 1. Snohomish chinook salmon escapement, 1965 - 2008. Annual observed values and 4-year moving averages (MA) are shown. Data from WDFW as reviewed and agreed to by the tribes.

Similarly, recent years have seen the highest escapements for coho (Fig. 2) in the Snohomish and chum (Fig. 3).

The increases in escapement for Chinook, coho, and chum since the late 1990s can all be attributed to decreasing harvest rates (for example, Fig. 2). However, there has been no corresponding increase in production that resulted from the higher escapements for any species, as shown, for example, by the failure of these runs to continue to grow, and in fact

exhibit some decline in recent years' escapement. From this and other lines of evidence[11] I conclude that overharvest is not a current factor limiting the production of salmon in most Puget Sound rivers.

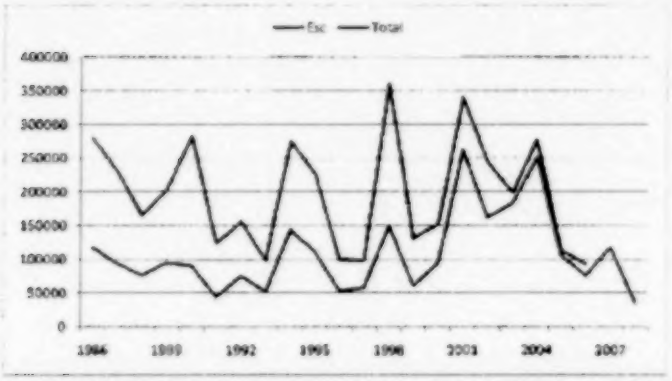

Figure 2. Graph of natural spawning escapement (Esc, lower line) and total run size (Total, upper line) for Snohomish coho, 1986-2006. The difference between the lines is harvest, which has greatly decreased over the period. The upturn in escapement is not associated with an increasing run size, suggesting that the escapement increase was due to the harvest reduction. SOURCE: My analysis of run size using exploitation rates from post-season "backwards FRAM" model runs computed by Larrie Lavoy of WDFW.

Hatcheries

Hatcheries have been used for more than 100 years in Puget Sound. As habitat was lost blocked, or irrevocably modified, agencies continued to build enhancement facilities with the thought that they could make up for declining natural production of salmon. Today they are ubiquitous, with state, tribal, and federal hatcheries operating in every major watershed (Fig. 4).

The theory behind salmon hatcheries is that, by removing a portion of the production from the dangers of part of the natural salmon life cycle, the overall productivity can be increased, thereby creating an opportunity for harvest that would not be present using natural production alone. The portions of the natural life cycle avoided in the hatchery life cycle are spawning, incubation, and early rearing. In some programs, fish are held and fed for up to a

[11] For example Sharma and Hilborn. *Can J Fish Aquat Sci* 58:1453-1463 (2001) analyzed data for coho salmon in 14 western Washington streams and concluded that "... the streams appear not to be spawner limited."

Habitat

It is almost universally agreed among salmon biologists that the principal factor contributing to the decline of salmon in the Case Area is loss of habitat required at several key life stages, for example, spawning and rearing, and degradation of the quality of remaining habitat that has not been fully lost.

Ocean Conditions

Survival of salmon from the point of migration from the estuary to the ocean to return to the river of origin is subject to fluctuating survival rates. Whereas some of the relationships between human activities and salmon survival in freshwater habitats are well understood, managers usually treat survival in the ocean as a "black box" that cannot be altered by our actions. Marine survival patterns are characterized by both interannual fluctuations and regime shifts. The latter represent fundamental changes in average survivals lasting 10 -20 years and giving rise to periods of "low", "moderate", or "high" ocean survival. The challenge for scientists trying to understand the causes of variability in salmon abundance is to control for marine survival fluctuations when looking for relationships with other factors.

The relationship between marine survival and freshwater survival can be illustrated in a conceptual model from an article by Peter Lawson, now with NOAA Fisheries (Fig. 5). In the face of both fluctuating ocean survival and degrading or shrinking freshwater habitat, a salmon abundance graph will show a pattern of fluctuating decline. As an example, using one of the longest available datasets for Puget Sound salmon, the terminal run of Skagit River Chinook appears to follow this pattern very closely (Fig. 6). The year-to-year variations reflect oscillating drivers, such as marine survival, annual climate variation, and the like. But, the overall trend for the 50-year period is downward, which can only be due to the effect of continually worsening freshwater habitat conditions. This pattern of fluctuating decline is seen in time series graphs of many Case Area salmon run sizes and catches.

A recent real world example of the conceptual model in Fig. 5 is the collapse of the Sacramento River fall Chinook stock and subsequent closure of the entire salmon fishery in California and southern Oregon. Experts reviewing the causes of this decline cite poor ocean conditions as the proximate cause of the production failure[4]. However, they point out that habitat loss and degradation has greatly weakened the resilience of Sacramento River fall Chinook such that the effects of poor ocean survival are exacerbated. They state that the ultimate cause that turned a production decline into a collapse was the loss of habitat quantity, quality, and diversity, and reliance on a small number of hatchery programs. Poor ocean conditions can cause poor survival, but loss of freshwater habitat worsens the effect of this on the resource.

[4] Lindley, S T and 25 coauthors (2009) "What caused the Sacramento River fall chinook collapse?" Pre-publication report to the Pacific Fishery Management Council, March 18, 2009
http://www.pcouncil.org/bb/2009/0409/H2b_WGR_0409.pdf

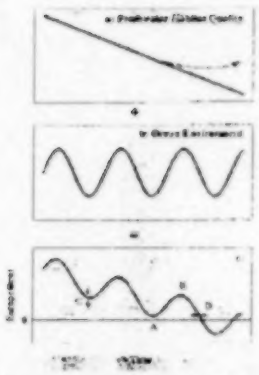

Figure 5. Graph of the relationship between freshwater production trends and marine survival fluctuations. SOURCE: *Fisheries* magazine[11].

Figure 6. Skagit River terminal area chinook run size, 1952- 2002. SOURCE: Skagit Chinook recovery plan.

[11] Copied from Lawson, P. (1993) Cycles in ocean productivity, trends in habitat quality, and the restoration of salmon runs in Oregon. *Fisheries*, Bethesda, MD

3. Current state of the salmon fishery

Current Harvest Patterns

In the Boldt Case area salmon harvest has shown a general pattern of decline for the last 30 years, at least. Tribal harvest deviated from this pattern for awhile, after the final decision in *U S v Washington* when tribal fleets expanded after the tribes were no longer prevented from exercising their rights to harvest 50% of the harvestable surplus from runs passing through their usual and accustomed fishing areas. However, since the mid-1980s, both tribal and non-tribal harvest in the Case Area has shown a fluctuating downward trend (Fig. 7).

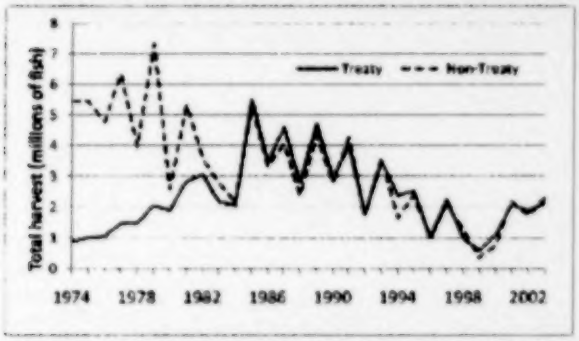

Figure 7. Total harvest of salmon and steelhead, all species, in the Case Area, 1974 - 2003. SOURCE: Harvest information provided by Keith Lutz[10].

Like salmon runs, salmon harvest is variable and affected by many factors. Tribal harvest numbers are determined by run sizes, fleet effectiveness, salmon prices, alternative economic opportunities, harvest of Case Area runs north of the US/Canada border, and conservation constraints on fisheries targeting abundant species in order to protect less abundant species harvested coincidentally. In my opinion, the decline in all harvest since at least the mid-1970s, and the decline in tribal salmon harvest since the mid-1980s is due to a general overall decline in salmon abundance and diminished opportunities on the ability to harvest abundant stocks because of increasing requirements to conserve weak stocks. Although many factors affect salmon abundance and harvest opportunity from year to year, the overall downward trend can only be attributed to loss of habitat quantity and quality.

Although tribal harvest opportunities continue to be available, these are increasingly dependent on strict controls as to the time, places, and manner of fishing, as well as on the artificial production of fish at salmon hatcheries. For example, the Tulalip Tribes harvest of

[10] Declaration of K. Lutz April 2009.

Chinook salmon has shown a slight decline over the past 30 years, but a major shift of the entire fishery to a small terminal area where hatchery fish can be targeted (Fig. 8). A similar shift is evident for coho (Fig. 9). Thus, due to chronic conservation concerns and lowered abundance of natural origin stocks, much of the Tulalip usual and accustomed fishing area is closed to salmon harvest at all times or opportunities are greatly diminished. Much tribal harvest now depends on hatchery fish produced at the tribes' own on-reservation enhancement facility.

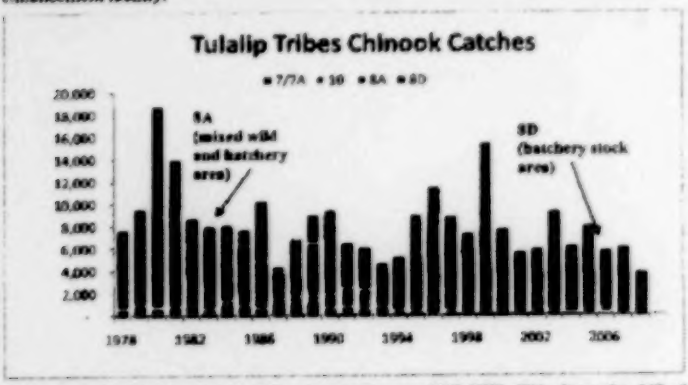

Figure 8. Tulalip Tribes chinook salmon harvest by area, 1978-2008. This shows the shift of nearly all harvest into Area 8D, a small terminal area where tribal members can harvest returning fish that were produced by the tribe at the Tulalip Hatchery. Nearly all of the tribe's usual and accustomed fishing area, extending 120 miles from the Canadian border to south of Seattle is permanently closed to chinook salmon harvest due to conservation concerns for natural chinook stocks. SOURCE: WDFW-tribal fish ticket database.

The reliance on hatchery production for maintaining harvest prevails for many of the tribes in the Case Area, especially in Puget Sound. For example, in terminal area net fisheries for coho, which are predominantly tribal, nearly 70% of the catch has on average been of fish that were produced in hatcheries (Table 3). Thus, these tribal fisheries depend heavily on hatchery production for coho salmon harvest opportunity.

While hatchery production can provide some harvest opportunity in the face of declining natural production, it comes at a cost in funds required to run the hatchery and potential negative impacts of hatchery fish on natural stocks. Hatchery fish are also less diverse than wild fish in their life history patterns and thus more susceptible to declines from natural catastrophes or changes in natural conditions. A current example is the recent severe decline of hatchery Chinook from the Sacramento River system and closure of the entire ocean fishery from Oregon south for at least two years. Increasing reliance on hatchery fish is most often associated with increased risk to fisheries. Only robust natural production can support sustainable salmon fisheries over the long term.

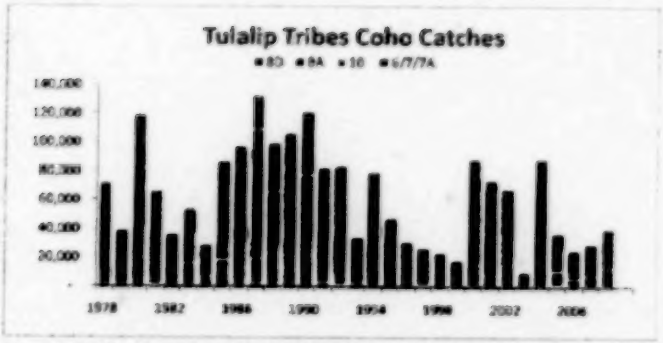

Figure 9. Tulalip tribes coho catches, 1978-2008, showing a shift to Area 8D similar to that shown for Chinook in Fig 4. SOURCE: WDFW-tribal fish ticket database.

Harvest Management in the Case Area

In the Case Area, salmon fisheries are jointly managed by the Case Area tribes and the State of Washington. These comanagers share responsibility for conservation of the resource and jointly determine how fishing opportunity will be apportioned between the non-tribal and tribal fishers so that each side will have a chance to harvest their share of the resource. The managers are then responsible for issuing and enforcing regulations that apply to their own users and that fit within the jointly developed management plans.

Salmon harvest management seems straightforward on the surface. A stock of salmon (for example, all of the fish of one species returning to a single river system) will have a requirement for a number of fish that must remain unharvested ("escapement goal") and pass through to the natural spawning areas in the river system. This number is often set as the population size that will allow for maximum sustainable harvest as determined *either* by analysis of observed escapement and return data from the recent past or from an analysis of current habitat quantity and quality. Fish returning in excess of this escapement goal are deemed harvestable, and the harvestable fish are allocated 50% to tribal fisheries and 50% to non-tribal fisheries.

Due to several factors, this simple model of salmon harvest management rarely applies in the real world. One complication is that the model does not work if there are fewer fish returning than are required for the escapement goal. Three factors often lead to this situation 1) low production due to degraded freshwater habitat, 2) poor survival in estuary and ocean waters, and 3) interceptions of fish north of the southern United States – Canada border.

When fewer fish than required for the escapement goal return, one might assume that there would be no harvest on that stock. However, the second complication to the simple harvest model comes into play here, namely the mixed-stock problem. Nearly all salmon fisheries are comprised of mixtures of stocks and species. Only rarely is a single species harvested, and even more rarely is all of the catch of one species from a single stock. In terminal areas, in rivers or near their mouths, or near hatchery release facilities, salmon harvests are predominantly of a single stock, but nearly always, there is some mixture of stocks in every fishery, and every stock is found to some degree in many fisheries. Thus, to realize a zero harvest on even just a few stocks might mean complete closure of much of the entire west coast to salmon fishing. Therefore, some low level of harvest is allowed on weak stocks, and fisheries are "shaped" through time, area, and gear restrictions to maintain low harvest rates on stocks of conservation concern while allowing more harvest on stronger stocks. To address the complexity of the mixture of stocks and fisheries, the comanagers use a computer model in their annual fishery planning discussions.

The FRAM Model for coho and Chinook

Salmon fisheries occur all along the west coast, with different stock mixtures for each combination of gear type, fishery location, and time of year. The comanagers use the Fishery Regulation Assessment Model (FRAM) to predict the cumulative impacts of annual fishing plans on west coast Chinook and coho stocks[17]. The coho FRAM includes 123 stock groups, representing nearly all west coast coho production. The Chinook FRAM includes 33 stock groups, representing most Chinook salmon production spawning in rivers from north-central Oregon northward to southern British Columbia. There are 73 fisheries in the Chinook FRAM and 198 fisheries in the coho FRAM. Most "stocks" in both models represent aggregations of actual stocks or populations and most "fisheries" in both models represent aggregations of actual fisheries (a particular gear type fishing in a particular area at a particular time period). The coho model divides the year into five segments[18] ("time steps"), and the chinook model into four segments[19], again representing an aggregation of what might be more accurately portrayed at a finer time resolution. So, the complexity of the model may be represented by the product (time steps) x (stocks) x (fisheries). But this is only a fraction of the complexity of the actual fishery.

The FRAM model uses abundance predictions for all of the model stocks as one key annual input. These are completed by the comanagers' biologists in December and January of each year, usually using statistically-derived relationships between the number of fish returning and prior spawning escapement, prior juvenile outmigration, and environmental variables. Where the numbers of juvenile outmigrants can be estimated with some degree of accuracy, as with in-river smolt traps for Chinook and coho or with beach seining for pink and chum fry, this often a precise predictor of subsequent adult returns for naturally-produced fish. If juvenile outmigrants cannot be directly estimated, then surrogate variables, such as the number of fish in the spawning escapement (directly related to the potential number of juvenile outmigrants produced), quantity of streamflow in the summer low-flow period (directly related to the amount of freshwater rearing habitat), and the effect of high water

[17] See Model Evaluation Workgroup. 2007. "Fishery Regulation Assessment Model: An overview for coho and Chinook". Pacific Fishery Management Council, Portland, OR, and supporting documents cited therein.
[18] Jan-Jun, Jul, Aug, Sep, Oct-Dec
[19] (prior year) Oct-Apr, May-Jun, Jul-Sep, Oct-Apr (following year)

THE HONORABLE RICARDO S. MARTINEZ

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, *et al.*, Plaintiff, vs. STATE OF WASHINGTON, *et al.*, Defendant.	No. C70-9213 Subproceeding 01-1 DECLARATION OF TYSON WALDO

I, TYSON WALDO, declare as follows:

I am over the age of eighteen, a United States citizen, and am competent to testify as to the matters set forth herein. I make this declaration on the basis of my personal knowledge, skill, experience, training, education and review of the State's culvert data, provided to the Tribes in this case. This declaration is made by me for the purpose of explaining how I prepared the maps and tables identified as Plaintiff Intervenor Tribes Proposed Exhibits.

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'Habitat.dbf' have already been adjusted for habitat quality and the annual 60-day low flow period.

37.3 In January of 2009, the State provided a WDFW FPDSI Habitat.dbf file containing habitat survey data from 1339 sites. Of those 1339 sites, 806 sites have at least some measure of stream length habitat upstream. Of those 1339 sites, 460 sites have at least some measure of "Spawning Habitat" upstream, and 507 sites have at least some measure of "Rearing Habitat" upstream.

37.4 I queried the FPDSI CULVERT.dbf and FPDSI_P1.dbf to select sites that are state-owned and potentially blocking anadromous fish passage. This resulted in 1155 sites. For those 1155 sites, there are FPDSI Habitat.dbf records for 1068 sites. From those 1068 sites, at least 634 sites have some measure of recorded habitat gain. Specifically 634 sites have a measure of habitat length, 411 sites have a measure of spawning habitat area, and 458 sites have a measure of rearing habitat area. Of the 634 sites, 147 are multiple upstream barriers and are removed from the potential lineal gain estimation. Of the 411 sites, 117 are multiple upstream barriers and are removed from the potential spawning habitat gain estimation. Of the 458 sites, 134 are multiple upstream barriers and are removed from the potential rearing habitat gain estimation. **Upstream of the remaining 487 sites with a measure of lineal gain, there are potentially705.79 miles of upstream habitat. Upstream of the remaining 294 sites with a spawning habitat measure, there is potentially 758,550 square meters of spawning area, and upstream of the remaining 324 sites of with a rearing habitat measure, there is potentially 3,702,693 square meters of rearing area.** The results are found in Proposed All Tribes, "Table 1 Estimate of anadromous

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salmon habitat upstream of DNR and DOT barrier culverts."

38. **WDNR Culverts**

38.1 The WDNR datasets , Barriers.mdb\ Culverts GIS dataset, the 'PI-2 21-all fish barrier costs 7-03.xls', the DNR_Update of Culverts for 1st & 2nd Set.xls and DNR's-repaired barriers dec 2006.xls were provided to me by counsel on December 19, 2006. In January of 2009, I received the file 'DNR repaired barriers nov2008.xls" and the R0008653\ culverts.shp file. In June of 2009, I received 'barrier1208.xls', a list of the 457 remaining DNR blocking culverts in the Case Area. The following assessment of WADNR barrier culverts in the case area is based on the list provided in the 'barriers1208.xls' file, the R0008653\ culverts.shp file and on the 'PI-221-all fish barrier costs 7-03.xls' file.

38.2 I linked the 'barriers1208.xls' to the R0008653\ culverts.shp file. I queried on the {CLVT_ANAD_FLG} field to select WDNR culverts associated with anadromous habitat in the case area. I queried 230 of the 457 culverts with anadromous fish presence from the combination of these two DNR datasets.

38.3 From the 230 blocking WDNR culverts I accounted for and filtered out multiple blockages upstream of a blockage as I had done for the state-owned culverts in the WDFW data. As with those culverts, had I not done so, my query would have resulted in multiple counts of the same upstream habitat. The final query resulted in 208 WDNR-owned culverts potentially blocking anadromous fish habitat.

38.4 To estimate potential upstream habitat and fish production, I linked the 208 sites to

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the 'PI-2 21-all fish barrier costs 7-03.xls' dataset. Of the 208 sites, 27 have no associated record in the 'PI-2 21 all fish barrier costs 7-03.xls' file. The 181 culverts that link from 'barriers1208.xls' to the 'PI-2 21 all fish barrier costs 7-03.xls' dataset are used for this assessment.

38.5 The WDNR data reports habitat length above a culvert in the [Upstream Hab. Gain (ft)] field in the 'PI-2 21-all fish barrier costs 7-03.xls' dataset. I converted the values in the field from feet to miles to summarize potentially blocked habitat length by WRIA in miles. The WDNR 'PI-2 21-all fish barrier costs 7-03.xls' dataset does not report on spawning habitat, so no spawning habitat is summarized for the WDNR potential blockages.

38.6 The WDNR 'PI-2 21-all fish barrier costs 7-03.xls' dataset record "rearing" habitat in the [Hab. Gain in m2] field. Unlike the WDFW data, the WDNR data also does not take into account habitat quality. I adjusted the [Hab.Gain in m2] field in the DNR data for habitat quality so that it could be used to calculate upstream habitat or adult anadromous salmonid production impacts using the WDFW methodology. To factor in habitat quality, I assumed a condition of 'Poor' for potentially blocked habitat above WDNR culverts. I assumed 'Fair' because in the Culvert Assessment Manual 'Fair' is the default habitat quality weighting (WDFW 2000). The WDFW methodology assigns a weight of 0.67 to a 'fair' condition. I therefore multiplied all the records in the [Hab. Gain in m2] field by 0.67. I did not adjust the WDNR habitat areas to reflect the annual 60-day low flow period because the data needed to calculate the annual 60-day low flow period for the WDNR culverts was not available. Additionally, WDNR calculates [Hab. Gain in m2] as (2* ([Width_ Ordinary High Water Mark]*[Upstream Hab. Gain_length])/2, so it is

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already a wetted area fraction of total habitat area.

38.7 **From these data, I summarized that there is potentially 198.75 miles and 364,713.56 square meters of anadromous salmon habitat upstream of 181 WADNR barrier culverts.** The results are found in Proposed All Tribes' Exhibits "Table 1 Estimate of anadromous salmonhabitat upstream of DNR and DOT barrier culverts."

Task 3: Potentially blocked habitat above state-owned culverts

- 19_Table 1 Estimate of anadromous salmon habitat upstream of DNR and DOT barrier culverts.pdf

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this 13th day of October, 2009, at Bellingham, Washington.

_____

Tyson Waldo

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Table 1. Estimate of habitat upstream of DNR and DOT culverts.

WRIA	OWNER	Length_mi	Spawn_sq	Rear_sq
01	DFW/DOT	58.05	4188.2.00	2259936.00
03	DFW/DOT	44.84	32490.00	166233.00
04	DFW/DOT	4.09	7935.00	16227.00
05	DFW/DOT	30.91	41084.00	143013.00
06	DFW/DOT	4.48	999.00	110788.00
07	DFW/DOT	65.15	38690.00	280702.00
08	DFW/DOT	90.19	116239.00	779813.00
09	DFW/DOT	1.81	142.00	12985.00
10	DFW/DOT	21.04	10857.00	66680.00
11	DFW/DOT	22.13	11,806.00	117529.00
13	DFW/DOT	3.12	1624.00	18204.00
14	DFW/DOT	20.82	19504.00	97542.00
15	DFW/DOT	89.11	118180.00	479987.00
16	DFW/DOT	6.16	10258.00	36319.00
17	DFW/DOT	46.92	29209.00	162221.00
18	DFW/DOT	38.58	40877.00	93587.00
19	DFW/DOT	42.17	49895.00	99084.00
20	DFW/DOT	31.69	76323.00	113482.00
21	DFW/DOT	20.19	40380.00	84389.00
22	DFW/DOT	86.64	84884.00	509289.00
23	DFW/DOT	38.27	18808.00	77106.00
	TOTAL	705.79	758660.00	3762983.00
01	DNR	2.56	0.00	7815.48
03	DNR	12.76	0.00	51038.08
04	DNR	2.43	0.00	5539.26
05	DNR	9.16	0.00	22617.40
07	DNR	24.80	0.00	49831.98
08	DNR	0.28	0.00	273.06
09	DNR	0.98	0.00	1851.34
11	DNR	0.00	0.00	0.00
14	DNR	0.85	0.00	1698.98
15	DNR	4.23	0.00	7451.00
16	DNR	0.00	0.00	0.00
17	DNR	12.81	0.00	15168.91
18	DNR	0.00	0.00	0.00
19	DNR	8.52	0.00	13287.12
20	DNR	32.20	0.00	57875.50
21	DNR	23.39	0.00	42988.32
22	DNR	15.10	0.00	54398.15
23	DNR	47.05	0.00	59710.84
	TOTAL	196.73	0.00	324713.35
	COMBINED	901.53	758660.00	4087696.35

WASHINGTON DEPARTMENT OF FISHERIES
WASHINGTON DEPARTMENT OF TRANSPORTATION

FISH PASSAGE PROGRAM
PROGRESS PERFORMANCE REPORT
FOR THE BIENNIUN 1991-1993

PREPARED FOR THE
WASHINGTON STATE LEGISLATURE

December 1992

Interagency Agreement FY 92.30(1)GC 9392

SUBMITTED BY

Tom Burns
Greg Johnson
Tanja Lahr

WASHINGTON DEPARTMENT OF FISHERIES
HABITAT MANAGEMENT DIVISION
SALMON HABITAT ENHANCEMENT AND REHABILITATION UNIT
AND TECHNICAL RESOURCE SECTION

Cause No. C70-9213, Sub. 01-1
Plaintiffs' Exhibit AT-052
7 - 1000001

EXECUTIVE SUMMARY

Wild salmon[1] have important cultural, ecological, and economic value to the people of the state of Washington. One threat to this resource is human-made migration barriers created by improperly installed or undersized culverts commonly installed to allow road crossings over salmon-bearing streams. Many of these culvert barriers exclude juvenile and adult salmon from valuable habitat, resulting in a decrease in salmon production and harvest opportunity. The 1991 Washington State Legislature recognized that culvert barriers threaten sustained salmon populations and the resulting harvest opportunity in this state. Hence, the Legislature in 1991 directed the departments of Fisheries (WDF) and Transportation (DOT) to cooperate in the inventory and correction of salmon migration barriers at state highway road culverts during the 1991-1993 biennium. This report documents 1991-93 biennium activities to date and planned activities for biennium 1993-95.

For biennium 1991-93, WDF and DOT participated in fish barrier resolution through two Memoranda of Understanding (MOU). The first concerns WDF, DOT, and Department of Wildlife (WDW) compliance with the Hydraulic Code. The second is an interagency agreement by WDF and DOT to conduct a fish passage inventory of state highway culverts and to correct six known barriers. This was subsequently modified to correct five barriers and to complete preliminary planning of two others. The optimistic goal of fish barrier resolution at all state road culverts is 20 years.

WDF and DOT also participated in interagency training and education of biologists, environmentalists and engineers. This included a full day training on salmon life history and fish passage problems at culverts.

Consistent with the interagency agreements, WDF has initiated an ongoing inventory of state highway culverts. To date WDF has inspected 726 state highway culverts in five of the six DOT districts. Of those inventoried 264 (36.4%) were determined to interfere with fish passage some percentage of the time, of which 126 (17.4%) were total blockages (Figure 1). Many more barriers are expected to be found with further inspections. Also, upstream habitat evaluation must still occur for most of the blockages. Complete correction of all existing state highway culvert barriers will take decades of planning, inventory, evaluation, and construction. This effort will clearly require administrative support for interagency cooperation.

[1] The orientation of this report is toward salmon, but many comments are applicable to wild steelhead as well.

BACKGROUND

The five species of salmon which evolved in the Pacific Northwest are strongly anadromous, meaning they reproduce in fresh water and mature in the ocean. All salmon have in common a requirement to use clean, stable, well oxygenated gravel habitats for spawning, often in the terminal headwaters of freshwater streams and rivers. Access to these habitats cannot be blocked without endangering locally adapted salmon. However, through the activities of humans and rare milestones in nature, salmon are sometimes blocked from prime spawning and rearing areas. A significant threat to the complete life cycle of any distinct group of salmon is road construction and the installation of road culverts, which often pose migration barriers. Increasing numbers of roads and culverts are a common product of a growing human population in Washington. Culverts often pose immediate or eventual migration barriers to salmon due to design which does not ever allow fish passage or design that does *not* account for the dynamic nature of flowing water, therefore resulting in a delayed barrier. These dynamics are caused by changes in hydrology of streams due to road-associated activities such as paving, fires, or clear cutting.

A common misconception is that barriers affect only adult salmon. Current life history research indicates movements of juveniles upstream into springs, ponds, marshes, and seasonal streams. Many of these areas are blocked to juvenile salmonids by culverts. Juvenile salmon are less powerful swimmers than adults and their ability to migrate through culverts is not clearly understood, which warrants further investigation.

Salmon provide this state valuable sport and commercial fisheries, but to do so they must migrate unrestricted to native streams in sufficient numbers to reproduce abundant, vigorous offspring. In Puget Sound and Strait of Juan De Fuca tributaries, an incomplete WDF inventory shows that 420 human-caused fish migration blocks of various kinds exist (excluding hydropower projects). At least 350 miles of spawning and rearing habitat are subsequently excluded from production in those areas. Human-caused blockages to adult salmon spawning and rearing habitat continues to be one of the most common and avoidable ways fish production is lost in the Pacific Northwest.

FISH PASSAGE INVENTORY

Process

The WDF Fish Passage Inventory can be divided into four phases: 1) a search on state highways for stream culverts which prevent or restrict the upstream migration of salmon, 2) further investigation of stream sections where these culverts are located to determine salmon presence in the streams and fish access up to the culvert, 3) measurement of habitat quality and quantity above the barrier culverts, and 4) engineering evaluation of improvements needed for fish passage. Data management and development of project lists occurs in conjunction with all four phases.

Search

Washington is divided into six Districts by DOT. WDF uses these designations for the culvert inventory schedule. District boundaries generally follow county lines, though some are different. Counties included in each district are: District 1- Island, King, San Juan, Skagit, Snohomish and Whatcom; District 2- Chelan, Douglas, Ferry, Grant and Okanogan; District 3- Clallam, Grays Harbor, Jefferson, Kitsap, Mason, Pierce and Thurston; District 4- Clark, Cowlitz, Klickitat, Lewis, Pacific, Skamania and Wahkiakum; District 5- Asotin, Benton, Columbia, Franklin, Garfield, Kittitas, Walla Walla and Yakima; and District 6- Adams, Lincoln, Pend Oreille, Spokane, Stevens and Whitman (Figure 2).

The order of District inspection was determined so the evaluation of culverts and streams would coincide with adult salmon presence to help verify fish access to culverts. For example, District 3, which includes the Olympic Peninsula, is being inventoried during November when coho salmon runs peak. Streams in Districts 5 and 2, where spring and summer Chinook are present, were evaluated during spring and summer of 1992. For this reason, District 1 was inventoried first, followed by Districts 5,2,3,4 and 6. Generally, three months are allotted to the inventory of culverts in each district.

The search for barrier culverts is conducted by driving each state highway and stopping at each stream crossing. The streams are identified using the WDF Catalog of Washington Streams and Salmon Utilization and a DeLorme Atlas of Washington State. The highway mile of the culvert is noted, using the vehicle odometer and highway mile posts. Those streams not appearing on either reference are identified by highway mile. Bridges are assumed passable and not evaluated.

Washington Department of Wildlife Pacific Northwest Environmental Database, and any other available information. Depending on the amount of information obtained from these sources, WDF may also identify species by electroshocking the stream, using a portable backpack electrofisher.

Downstream barriers are located by surveying the stream from the culvert to the mouth. All barriers to salmon are noted. A culvert with natural barriers downstream may be given no further consideration as a project of immediate importance. If a resolvable human-caused barrier is located below a DOT fish passage problem the project still is given a priority.

Habitat Measurement

The amount of salmon habitat blocked by each impassable culvert is measured next. Habitat evaluation begins at the barrier, and proceeds upstream. The string from a belt chain is tied to the culvert, and surveyors (usually two people) walk upstream. The belt chain measures the distance walked, in meters.

In addition to measuring the length of usable stream above the culvert, surveys divide the stream into pools, riffles, and rapids. Total surface area is also calculated. For creeks less than one mile long, a 30-meter sample is taken after every 0.1 mile walked. In streams more than one mile long, 60 meter lengths are sampled every 0.2 miles. In each sample area, the streambed composition is estimated (percentages each of boulder, rubble, gravel and sand present), and the stream gradient is measured with a clinometer (see Appendix C for physical survey format).

Measurement continues until a natural barrier is reached, or the stream is too small or steep for salmon use. If a human-made barrier is reached, the end of immediate habitat is noted, and the survey is continued. The area above this barrier is termed potential habitat. If a natural barrier is reached, or gradients exceed 7%, the survey is ended.

The information collected in the habitat survey is entered in a spreadsheet program which uses the riffle, pool and rapid measurements to compute the total spawning and rearing habitat areas (in square meters) for both the immediate and potential habitat areas. Pool areas are considered rearing habitat, and riffle areas are considered spawning habitat. Rapids are considered unusable by salmon, except as transport waters. Riffle:pool:rapid ratios are also computed.

The Priority Index

Characterizing and prioritizing corrections to fish passage barriers is complex in terms of cost, habitat gain, and multi-species utilization. Early in the inventory planning stages, a numeric modeling approach to prioritizing projects was developed, which recommended correction of those passage problems which were most feasible first. To do this, the numerous factors which affect a project's feasibility are used, including: passage improvement, production potential of the blocked stream, size of blocked stream habitat, affected fisheries, affected stock status listed in the Washington State Salmon and Steelhead Stock Inventory (SASSI)[1], and project cost. The result is a numeric indicator giving each project's priority. LOG .25 (the quadratic root) of the project variables product is calculated to provide a more manageable number for the priority index. Supporting data for the fish passage prioritization are attached in Appendix C. The priority index (PI) for each barrier is calculated as follows:

$$PI = \sum_{\text{all streams}} [(BPH) \times FDC]^{1/4}$$

Where:

PI = Priority index (i.e., relative project benefit considering cost)

B = Proportion of passage improvement (i.e.,proportion of run expected to gain access by the project)

P = Annual adult equivalent production potential per m^2 (this incorporates juvenile survival factors if juveniles, but not adults, utilize habitat, Appendix D).

H = Habitat gain in m^2

F = Fishery impact modifier (Appendix E)
- 3 = a stock managed on a wild stock basis whose enhancement would have allowed a higher exploitation rate at least twice in the last eight years in mixed stock fisheries (where allocation units are mixed). (e.g. Skagit or Hood Canal coho)
- 2 = a stock managed on a wild stock basis whose enhancement would not have allowed a higher exploitation rate at least twice in the last eight years in mixed stock fisheries, but would typically have allowed a higher exploitation rate in terminal and/or extreme terminal fisheries (e.g. Snohomish or Stillaguamish chum).
- 1 = a stock not meeting the conditions for 2 or 3 (e.g. Nooksack coho).

D = Depleted Stock modifier
- 3 = a stock listed as critical in the SASSI report (e.g. Snake River spring/summer chinook or sockeye).

[1] Report is being finalized

2 = a stock listed as depressed or a stock of concern in the SASSI report (e.g. Nooksack coho)
1 = a stock not meeting the conditions for 2 or 3 (e.g. Samish chum)

C = Cost modifier (low, medium, high)
3 = incremental funds needed ≤$100K because of actual cost &/or constituency (monetary) support &/or funds that are already programmed for road improvement that do not have to be spent specifically on fish passage
2 = incremental funds needed >$100K and ≤$500K....
1 = incremental funds needed >$500K....

Activities and Costs by DOT District

Following is a summary of WDF work completed to date in each district. See Table 1 for expenditures by district.

District #1

Highway types in District 1 range from the urbanized I-5 corridor and freeways in King and Pierce counties, to rural mountain roads in the northern reaches of the district. Steep rural roads often have high road fills over stream crossings, making access and culvert evaluation physically difficult. High-speed urban roads are also difficult to evaluate, due to high volumes of traffic and the dangers of parking and working along narrow road shoulders. Also present are lowland tributaries which flow through wetlands and agricultural areas. All five species of Pacific salmon (chum, chinook, coho, pink and sockeye) are present in this district, although not all are necessarily represented in each stream. Streams impacted by barriers at state highways in this district are used by chum and coho; backwatered areas and small tributaries are important for the rearing of coho juveniles. Chinook salmon are also present in this district. Adult chinook generally utilize large tributaries, usually spanned by bridges. Sockeye salmon are found in Lake Washington and its tributaries, while pink salmon are widely distributed in the district.

Work in this district took place beginning in January of 1991, and ending in early April of 1992 (although work began in November, the time between November and mid-January was spent in training and methodology development). After preparation, inventory in District 1 began January 16th. March and April were spent investigating salmon presence and conducting downstream surveys, and measuring habitat above barrier culverts. Due to the three-month district limit, WDF was not able to completely evaluate all state routes in this District, nor were we able to survey the stream area above and below all of the impassable culverts found.

APPENDIX C

Supporting data for DOT inventory fish passage priority index.

COHO

Estimated smolt to adult survival for Washington streams = 10%. State of Washington Department of Fisheries Department of Natural Resources Progress Report No. 233 Riverine Pond Enhancement Project October 1982-December 1983. W. Phil Peterson, October, 1985 p. 33.

Estimated fingerling to smolt survival for Skagit River waters = 40%. Skagit River off channel trapping. Chris Detrick personal communication - 1992.

Estimated production per square meter of habitat for coho salmon smolts = .43/square yard or .5/square meter. Methodology for Determining Puget Sound Coho Escapement Goals, Escapement Estimates, Pre Season Run Size Prediction and In-season Run Assessment. Technical Report 38, Washington Department of Fisheries. 1977.

Based on this information the estimated adult production per square meter of total stream area in Washington streams is .05 adult coho per square meter of stream area.

SPRING CHINOOK

Marshall and Britton (1980) use coho production potential to apply to spring chinook - assumes that yearling spring chinook and yearling coho occupy their respective habitats at the same densities = .5/M square.

Mean smolt to adult survival (Lindsay and Jonasson - 1983) and Wahle et. al. (1981) estimate .4 to 3.2% smolt/adult survival, mean of this = 1.8% for spring chinook. White Salmon River Productivity Report Draft, November 1989, p. 19.

Spring/Summer chinook modifier = .009 adults/M square of total habitat.

FALL CHINOOK

IFIM Method - resulting value is factored by a smolt density value of .37 smolts/M square (Chapman - 1991), derived from research on the Big Qualicum River in British Columbia. Mean survival from smolt to adult = 1.5% (Wahle and Vreeland - 1978) White Salmon River Productivity Report - November, 1989. Draft. p. 22.

SOCKEYE

Foerster - 1968 estimates overall survival of Fraser and Columbia River Sockeye at 0.25% egg to adult. Further he estimates the sustained catch to escapement ratio at 4:1 for those regions. P. 68. Foerster further documented one fully utilized 360 square yard section of Williams Creek to be at 103 females and 109 males for a density of 3.5 square yards (2.9 square meters). At densities above this "new unspawned fish attempting to start a redd were attacked by other females."

Hence: for sockeye, one sockeye redd = 2.9 meters square of spawning habitat. Two spawning adults will produce 3,800 eggs x .25%. Overall survival = 8.75 adults per 2.9 meters square = 3 adults produced per meter square of spawning habitat (p. 122).

Foerster, R.E., The Sockeye Salmon, Oncorhynchus nerka. Fisheries Research Board of Canada, Ottowa 1968. Bulletin 162.

CHUM

Tom Burns, unpublished, calculated chum production by the following:

0.5 (female/meter square) X meters square of spawning habitat X 3,500 eggs/female X .10 egg to fry survival X .01 fry to adult survival.

PINK

Currently it is proposed this model uses chum feasibility for pinks.

FISH PASSAGE PROGRAM
PROGRESS PERFORMANCE REPORT
FOR THE BIENNIUM 1993-1995

Prepared for
THE WASHINGTON STATE LEGISLATURE
JANUARY 1995
INTERAGENCY AGREEMENT FY 92-93(1)GC 9392

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WASHINGTON DEPARTMENT OF FISH & WILDLIFE
HABITAT PROGRAM

Salmonid Screening, Habitat Enhancement, and Restoration (SSHEAR) Division

and

Engineering and Technical Services Division

Washington Department of FISH and WILDLIFE

Washington State Department of Transportation

Cause No. C70-9213, Sub. 01-1
Plaintiffs' Exhibit AT-053
T - 1006072

EXECUTIVE SUMMARY

For many reasons, protection of salmon and trout and the critical habitat in which they live is essential in the Pacific Northwest. One serious problem to salmonid production in Washington is impassable road culverts. In numerous cases, miles of productive freshwater anadromous fish habitat have been blocked from anadromous fish by a single barrier road culvert. Correction of human-made barriers to fish migration is one of the most cost effective habitat restoration strategies available because habitat gains from a minimal amount of work are often large. Hence fish access to habitat has become an important, timely issue and has been addressed by the Washington State Legislature during the bienniums 1991-1993 and 1993-1995. In addition, correction of human-made fish migration barriers is required by the following State Laws: RCW 75.20.060, entitled "Fishways required in dams, obstructions-penalties, remedies for failure", RCW 75.20.061, "Director may modify inadequate fishways and fish guards", RCW 77.16.210, entitled "Fishways to be provided and maintained", and RCW 77.12.425, "Director may modify inadequate fishways and protective devices"

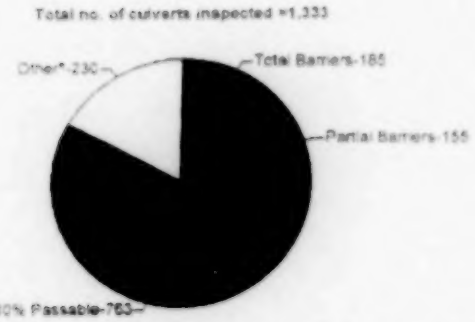
Documentation of efforts to inventory and correct fish passage problems at Washington State highway culverts is the topic of this report. It examines Washington Department of Transportation (WSDOT) and Washington Department of Fish and Wildlife (WDFW) activities pursuant to inventory and correction of fish passage barriers at state highway road culverts for the biennums 1991-93 and 1993-95. It is an update to the Fish Passage Program Progress Performance Report for the Biennium 1991-1993 completed in December 1992. Many methodologies for this inventory were developed in 1991, discussed in the last report, and will be referred to in this document. In some cases revisions to the original methodology occurred this biennium and will be discussed in this report.

For the biennium 1993-95 WDFW and WSDOT continued with inventory and fish barrier resolution through interagency agreement (Appendices II-IV). The purpose of the agreement is to provide funding to continue with a fish passage inventory of state highway culverts and to correct six prioritized barriers for the biennium that have resulted from the inventory.

The WSDOT / WDFW strategy for inventory and correction of fish passage barriers is as follows:

- Reporting and documentation of state highway road culvert fish passage problems (inventory).
- Verification of fish passage up to barrier culverts, quantification and qualification of blocked habitat, and prioritization of barriers for correction based on cost benefit evaluation called priority indexing.
- Design and construction of fish passage facilities on high priority barriers (most cost effective) with dedicated barrier correction funding.
- Concurrently identify and correct fish migration barriers associated with safety and mobility road projects.

To date, WDFW has completed all of the road culvert inventory segment and has inspected a total of 1,333 culverts on state routes throughout all six WSDOT Districts. WDFW has identified 340 barrier culverts for further evaluation. WDFW has located a total of 185 total migration barrier culverts, and an additional 155 culverts having a partial blockage to salmonids.



"Other" indicates culverts for which no passability estimates were made, due to problems such as no access up to the culvert, no anadromous habitat gain upstream of culvert, etc.

Surveys, habitat assessments, and downstream verification of fish passage up to identified barriers have been completed on 91 streams out of the total 340. A total potential rearing area of 318,000 square meters (m^2) is currently blocked by WSDOT culverts on these 91 streams; this is roughly enough wetted stream area to produce 29,000 adult salmon annually. Approximately 105 linear miles of spawning and rearing area are known to be blocked from salmonid production by barrier WSDOT culverts on the 91 surveyed streams. All physical surveys are planned for completion by July 1997.

Working together, WDFW and WSDOT have resolved ten barrier culvert problems since 1991, with planning underway for resolution of another six during the next biennium (1995-1997). To

date. WSDOT fish passage projects accomplished include:

Tumwater Creek Fishway
Parish Creek Fishway
Fisher Creek Fishway
Green Creek Fishway
Unnamed Tributary to Skykomish Fishway
Chuckanut Creek Fishway
Evans Creek Fishway
Bagley Creek Fishway
South Fork Nemah River Fishway
Squalicum Creek Fishway

Total habitat gained for these projects was 121,300 m^2, or roughly enough stream area to produce 14,600 adult salmon annually.

During the 1993-95 biennium, it was recognized that long-term planning between WSDOT and WDFW should include not only dedicated, independent funding projects, but communication between the two agencies to accomplish barrier correction in conjunction with planned road projects such as safety and mobility improvements regularly done by WSDOT. Given the number of barriers identified in the inventory, it would take over a century, with a much lower benefit to cost ratio to correct 340 barriers using only dedicated funding (correcting 3 barriers/year). The benefit/cost ratio increases as the number of culverts repaired per year increases. Using a method such as road project-associated culvert repairs, fixes would be done quickly and costs of mobilization would be greatly reduced since equipment would be on-site or in the vicinity for road construction. Road project-associated fish passage improvements would require long term commitment by the legislature and would be beneficial in correcting problems affecting many depressed salmonid stocks in need of immediate attention. In the future, this strategy could assist in avoidance of petitions under the Endangered Species Act. Working for correction through road improvement work, it was determined that over a century of fish passage work could be reduced to two or three decades. The end result would be a process incorporating accelerated correction for high priority barriers and organized, efficient correction of the remainder of barriers.

WDFW is continuing interagency education and training efforts with frequent interagency staff meetings, and by forwarding a quarterly information bulletin update summarizing activities and strategies to WSDOT. In addition, day-long workshops entitled "Fish Passage Design at Road Crossings" were conducted on June 2, 1992, November 23, 1993 and June 15, 1994. A repeat is planned for January 18, 1995, and WDFW is planning to publish articles related to fish passage and inventory of culverts for the WSDOT Maintenance Newsletter, beginning in January 1995.

Consistent with interagency agreements, WDFW has completed on-site culvert inspections within all six WSDOT Districts and is now working on habitat evaluations and fish use verifications at culverts thought to be blocking fish from usable habitat. These evaluations will be completed during the 1995-1997 biennium. Resolution of all culvert blockages will take decades of planning, surveying, design, and construction. This effort will clearly require administrative and legislative support.

BACKGROUND

It is recognized that salmon and trout are extremely important to the culture and economy of the Pacific Northwest, particularly in coastal communities, where the impacts of low salmon returns and fishing closures in 1994 have left port towns in financial crisis.

Similarly, it is recognized that wild, locally adapted salmon play an important role in a complex ecological food web that involves many types of birds and animals; some species listed as endangered, threatened, monitor, or candidate under the Endangered Species Act (ESA) depend to some degree on the distribution and abundance of salmon and trout.

Alarming declines in anadromous fish in Washington during the early 1990's have caused intensive concern among fish managers, commercial and sport fishing interests, environmentalists, Native Americans, and legislatures. Overharvest, hydropower development and habitat degradation, as well as oceanic events such as El Niño, are often referred to as causes. One habitat-related cause for weakening of salmon production which can be comparatively easily resolved is human-made barriers to fish migrations caused by improper placement of road culverts. Increasing numbers of roads and resulting culverts are a common product of a growing human population in Washington. Culverts often pose immediate or eventual migration barriers to salmon due to design which does not allow passage, or design that fails to consider the hydrology of watersheds, resulting in a delayed barrier. Changes in hydrology of streams can be natural or can result from watershed-related activities such as logging, road construction, paving, or fires. These factors can cause a passable culvert to become a barrier once streambed scour occurs below the culvert. In recognition of this, the Washington State Legislature directed the former Department of Fisheries (now the Department of Fish and Wildlife) and the Washington State Department of Transportation to cooperate in the inventory and correction of salmon and trout migration barriers at state highway road culverts in the 1991-1993 and 1993-1995 bienniums.

A common misconception is that only adult salmonids are affected by culvert barriers, as they return from the ocean to native rivers and streams to spawn. Recent life history studies on salmonids reveal that culverts can also limit juvenile production by blocking them from important rearing areas. Research indicates the upstream movement of young salmonids during the winter months into areas of low velocity such as ponds, swamps, and marshes, often referred to as off-channel habitat. Young salmonids cannot attain the swimming speeds of adults and are easily blocked from these areas by improperly placed culverts. It is also a common misconception that streams which dry in the summer have no value to salmonids; this is also not the case. Chum, pink, and sockeye salmon use these areas for spawning, and juvenile coho salmon or chinook salmon for rearing during high-flow months.

WDF / WDW / WSDOT Memorandum of Understanding (GC 9058)

On December 27, 1990, final signatures were obtained for the interagency Memorandum of Understanding (MOU) GC 9058 (Appendix III) among the Washington State Departments of Fisheries, Wildlife, and Transportation concerning compliance with the Hydraulic Code (RCW 75.20.100 and Chapter 220-110 WAC) (Appendix I). Its purpose was to provide a mutual understanding among the participating agencies of procedures and standards for the application and acquisition of Hydraulic Project Approvals (HPA). Within the agreement is the requirement that WSDOT apply for the HPA to WDW or WDF for all instream projects, and for WDF or WDW to provide a timely response so road projects can proceed.

The MOU defined key words that frequent negotiations concerning fish migration barriers: enhancement, emergency, fish passage barrier, hydraulic project, mitigation, and transportation project. This MOU requires annual meetings between agencies in advance of construction dates where plans for new road construction or maintenance and potential wildlife or fisheries impacts can be addressed. Other items addressed in this MOU are maintenance guidelines for dealing with emergencies, needed training, resolution of concerns, and MOU duration. Finally, this MOU includes an Appendix outlining fish passage guidelines to be administered at future road culvert construction or maintenance sites.

WDF / WSDOT State Interagency Agreement For Fish Passage Inventory and Barrier Removal (GC 9392)

In 1991, the Legislature directed WSDOT to correct six fish barriers during the 1991-93 biennium. To further facilitate this mandate and locate other fish passage problems at state highways in Washington, WDF and WSDOT entered into a specific State Interagency Agreement to perform a fish passage inventory statewide and work collectively in planning projects and developing agreements to remove fish barriers at WSDOT culverts (Appendix II). This agreement commenced December 6, 1991, and provided the initial funding for both the newly organized fish passage inventory section in WDF and the correction of fish passage problems. Amounts allocated for inventory and correction were $105,000 and $280,000, respectively, for the biennium.

WDFW / WSDOT Memorandum of Understanding Inventory and Barrier Removal

On June 24, 1993, WSDOT, and the former WDF entered into an agreement (WDF #10-000030) to proceed with work outlined in previous agreements GC 9058 and GC 9392 (Appendix IV). The agreement provides funding for statewide inventory of fish passage barriers on WSDOT rights-of-way and removal of barriers independent of highway construction projects. WSDOT agreed to provide funding in the maximum amount of $730,000 to correct barriers identified through the inventory process (refer to Table I for the Budget / Function summary for the WSDOT / WDFW Fish Passage Inventory). Further, it provided $380,000 to continue inventory activities, with funding by the 1993 legislature.

ROAD PROJECT AND BARRIER REMOVAL PLANNING

During the 1993-95 biennium, it was recognized that long-term planning between WSDOT and WDFW should include not only funding for dedicated, independent fish passage projects, but also

- close communication and coordination between the two agencies
- identification and correction of barriers in conjunction with road work, and
- long-term commitment by the legislature

This became apparent when it was estimated that it would take over 100 years to correct all barriers at state highway culverts with independent fish passage projects alone. Alternatively, a carefully designed blend of this effort with fish passage work on mobility and safety road projects could reduce this time span to roughly two to three decades. This improves cost efficiency because mobilization and some work efforts at the culvert sites would not have to be duplicated and because benefits of restored fish production would not be delayed nearly as long. In fact, it has been estimated that every dollar spent on fish passage work will return a minimum of four dollars in fish benefits, even when not considering nonconsumptive values. This is particularly important for those fish stocks that are depressed to the point of potential listing under the Endangered Species Act. Obviously, correction of a problem to avoid such listing would circumvent the large recovery costs.

These concepts have been embraced by the two agencies, as reflected in the sharing of information concerning anticipated road work and fish passage barriers. Corresponding budget request packages to implement this approach have been agreed to by the agencies and submitted for legislative approval. The end result will be a process incorporating accelerated correction for high-priority barriers and organized, efficient correction of the remainder of barriers.

Phase I - Search

The search for barrier culverts was conducted by driving each state highway and stopping at every stream crossing. Bridges were assumed passable and not evaluated. Streams were located and identified by name and/or WRIA # (Water Resource Inventory Area #) using the WDF Catalog of Washington Streams and Salmon Utilization and a DeLorme Atlas of Washington State. Stream crossings were also identified by highway mile. After identification of the stream crossing, data on the culvert were collected using a WDFW / WSDOT Culvert Report form (Appendix VI). If the culvert appeared 100% passable to salmonids, data was collected only on its size and location. The passability estimate represents the percentage of fish expected to pass, of those that approach the culvert and require passage. Passability varies with flows, species, and tidal influence. If the culvert posed a passage problem to salmonids, a passability estimate was made and more detailed information was collected. This information included the slope and length of the culvert, the dimensions of the plunge pool, mean annual precipitation, substrate composition, and inlet information, as well as other data[1]. A photo was also taken of each barrier culvert. Culverts in local drainage ditches or those on streams with natural barriers (high gradient, waterfalls) located immediately up- or downstream of the highway were not evaluated; in most of these cases, the stream name and culvert size information was collected, and a code of NA (no access up to the culvert) or NG (no habitat gain above the culvert) was noted in place of a passability estimate. The decision whether or not to evaluate a culvert was made by the inventory team at the site.

Following the inspection of culverts, a prioritized list of barrier culvert sites needing further evaluation was developed for each District. The sites were prioritized using the passability, basin area, habitat quality, feasibility of construction, and species estimates obtained during the culvert evaluation. Fish presence verification, downstream passability, and habitat measurement proceed according to this listing, beginning with those streams highest in priority. Therefore, the first streams investigated are those with the highest potential benefit to fish production.

Phase II - Fish Presence / Downstream Passability Verification

To ensure that barrier correction projects will not be undertaken in areas which are not accessible to fish, the second phase of the inventory entails verification of fish presence in each stream on which a barrier culvert has been found, along with downstream surveying to determine if salmonids have access to each barrier culvert[2]. Species present are identified using information from WDFW Regional Habitat Program Managers and Area Habitat Biologists, local biologists and residents, the Catalog of Washington Streams and Salmon Utilization, the WDFW Spawner Survey database, and any other available information. Species may also be identified by electroshocking the stream using a portable backpack electrofisher.

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[1] The culvert form has undergone several changes since the Fish Passage inventory began. These changes include the addition of several pieces of information about barrier culverts, including: Depleted Stock and Cost Codes (Priority Index, p.11); Habitat Quality (ranked 1-10); Feasibility (ranked 1-10); and Road Fill Height / Ease of Access (ranked 1-10) (Appendix VI).

[2] Areas not accessible to anadromous fish may receive attention in the future, since non-anadromous fish also benefit from increased habitat availability.

Downstream verification of passage entails walking the stream from the barrier culvert to the mouth. Any impediments to salmonid passage are documented. Culverts with natural barriers such as falls or barrier cascades present downstream are generally not investigated in more detail as potential projects (at some point in the future, after resolution of higher-priority projects, they may be given further consideration). If a resolvable artificial barrier is located downstream, the stream is surveyed.

Phase III - Habitat Measurement (Physical Surveys)
Once downstream fish passage has been verified, measurement of the amount of fish habitat blocked by each impassable culvert is conducted. Physical habitat surveys estimate the amounts of spawning and rearing habitat upstream of the culvert in square meters (m^2). The habitat values are components of the Priority Index model, which is used for prioritization of potential projects (Priority Index, p.11). Habitat evaluation and measurement begin at the barrier, and proceed upstream. In addition to measuring the length of usable stream above the culvert, surveys divide the stream into habitat types: pools, riffles, rapids and ponds. This is done by sampling 30-meter portions every 161 meters (one-tenth mile) more intensively (60-meter portions every 322 meters in streams greater than one mile in length). Within sample areas, habitat types (riffle, pool, rapid and pond) are delineated and measured; streambed substrate composition (percentage of boulder, rubble, gravel and sand) within each type is estimated; and the stream gradient is measured. The samples result in an estimated ratio between habitat types which is then applied to the total length of the stream to obtain total riffle, pool, rapid and pond areas. These areas are then used to calculate spawning and rearing areas (see below). Any artificial barriers to salmonid passage are also documented. Measurement of habitat proceeds upstream from the barrier culvert until a natural barrier is reached, the stream is too small for salmonid use, or gradients consistently exceed seven percent.

The methods for both measurement and calculation of the amount of rearing and spawning habitat potentially available upstream of barrier culverts have undergone major changes during the 1993-1995 biennium. Revision of the existing methodology (Legislative Report, Biennium 1991-1993, Appendix D) began in June 1993. The revised methodology is shown in Appendix VII. One major revision incorporated is the breaking of the stream into discrete reaches, defined by gradient, tributary junctions, and other major morphological changes. This results in the grouping of similar lengths of stream into the same reach.

Changes have also been made in spawning and rearing habitat area calculations. In the previous survey format, spawning area was defined as total riffle area. However, since spawning occurs mainly in late fall/early winter, when flows are at or near Ordinary High Water, and habitat types other than riffles may be used for spawning, this method can result in an underestimation of spawning area. The revised physical survey format defines spawning area as the sum of the areas of each habitat type at Ordinary High Water, multiplied by the habitat type's gravel percentage. The Ordinary High Water line is defined as the point where "the presence and action of waters are so common and usual and so long continued in ordinary years, as to mark upon the soil or vegetation a character distinct from that of the abutting upland" (WAC 220-110-020, 1994). Widths at Ordinary High Water are determined during the survey using the bank vegetation line, and other hydrologic evidence. Spawning area is then further multiplied by a Habitat Quality Modifier, which

LIMITING FACTOR - If a habitat quality modifier other than 1 is assigned to a reach indicate why in this space. A simple note will suffice (dairy waste, unstable bed, lacking riparian vegetation, lacking in stream cover, irrigation return water, stream dry, high summer temperatures etc.

SURVEY ALL POTENTIAL HABITAT ABOVE A BARRIER - We will eliminate the category "immediate habitat" and call all habitat above a barrier potential habitat. This will include habitat above secondary barriers upstream of subject barrier provided the barrier has a reasonable potential for correction. When secondary barriers are encountered their location should be entered into the "multiple barriers" space in your field data notebook as distance in meters above the primary barrier. This may be directly tied to the data base via the unresolved fish passage problem identification report which you are currently completing at each man made barrier located.

1) **Stream length**

a) A belt chain measuring in meters and using a 3 strand, biodegradable thread is worn, and the stream is walked from the downstream end of the survey area.

b) To determine total potential habitat available above a barrier, the survey is continued to a point when the gradient consistently exceeds 7.0 % for a distance of at least one tenth of a mile or an anadromous barrier is reached.

c) **MULTIPLE BARRIERS** Frequently, additional man made or temporary (beaver dam, log jam) barriers exist which must be corrected to realize the potential habitat gain above the primary barrier. In this case, note the river mile of each additional barrier in the "multiple barrier" space on your survey form and identify your method of river mile identification (chain belt, stream catalogue, aerial photo, USGS quadrangle).

d) A fish passage barrier identification form should be filled out and submitted for each man made barrier encountered.

e) The multiple barrier river mile locations will appear as an additional field in our fish passage database.

2) **Sample Frequency**

a) Where the survey is predicted to be over 1.0 mile long, sample sections are 60 meters in length and taken at the beginning of each 0.2 mile (322 meters) section of stream. b) Where the survey is predicted to be under 1.0 mile long, sample sections are 30 meters in length and taken at the beginning of each 0.1 mile (161 meters) section of stream. Note: Depending upon the location of the end of the survey, the rate of sampling calculates out to be no less than 18.6% of the total stream length surveyed.

T - 660162

FISH PASSAGE PROGRAM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
FISH PASSAGE BARRIER REMOVAL PROGRAM

Progress Performance Report

For

Fish Passage Inventory, Corrections and Project Evaluation

March 31, 1998

Submitted By:

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Washington Department of Fish and Wildlife
Lands and Restoration Services Program

Salmonid Screening, Habitat Enhancement and Restoration (SSHEAR) Division

Cause No. 275823 Sub. 317
Plaintiffs Exhibit AT-055

Introduction

Inventory and correction of fish passage barriers associated with roadways and other structures is a growing priority for those who manage Washington's streams, lakes, and wetlands. Department of Fish and Wildlife, tribes, and private organizations have recently assessed fish passage at many culverts under state highways, county roads, and private driveways. As a result of these assessments, the difficulties salmonids face in accessing habitat once part of their historical range has become more apparent. The results of recent inventories in Washington estimate salmonids are currently blocked by barrier culverts numbering in the thousands.

This recurrent problem can be corrected cost effectively in most cases. In recognition of this, the Washington State Legislature, the Washington Department of Fish and Wildlife (WDFW) and the Washington Department of Transportation (WSDOT) have been cooperatively working to inventory, assess, evaluate, and correct culvert barriers located on stream crossings under state highways. (see Appendix I, for a summary of the WSDOT Barrier Culvert database).

WSDOT plans to address all the barriers with their 20 year System Plan. The 20 year System Plan is a three pronged approach. It first designates highest priority fish passage barriers and systematically removes these barriers utilizing Environmental Retrofit Program funding. Secondly, as Transportation Projects are programmed requiring hydraulics permits, additional fish passage barriers are removed. This approach leads to a decrease in barrier removal costs by combining projects and sharing the expense of mobilized equipment. And third, some fish barriers are removed as a result of normal WSDOT's maintenance activities.

Estimates of the number of barriers requiring correction have recently expanded to include stream reaches that benefit resident game fish species and habitat associated with stream gradients up to 20% slope. These changes were required to comply with current fish passage and stream typing statutes. The 20 year System Plan should be reviewed and updated to reflect these changes.

Evaluation of fish passage projects has also been given high priority in the WSDOT inventory and barrier correction. This insures completed fishways are functioning properly and providing durable and efficient fish passage that can increase fish production. To facilitate this a three-level culvert and fish use evaluation has been designed and implemented. Results are presented in Appendix II, Appendix III, and Appendix IV.

Documentation of corrected barriers, long term planning for future corrections, methodologies, and results of evaluations are the topics of this progress report.

Also outlined in this report is a six year WSDOT planning process to facilitate long term funding and correction of high priority barriers.

Project Evaluation for Dedicated Funding Projects, Before and After Barrier Removal

Working with recommendations and funding support from WSDOT, WDFW has developed a three level culvert and fish use evaluation procedure to be done on planned and completed dedicated funding projects. It is intended to determine utilization of the newly accessible habitat and remedy problems associated with fish production such as chronic low escapements, habitat degradation, or non point watershed problems. Level 1 is the initial evaluation to determine fish use prior to a project and during the one year guarantee period following the barrier correction. Level 1 evaluation is funded by WSDOT and is done on all projects (see Appendix II and Appendix IV). Level 2, funded by WDFW, is designed to monitor and make appropriate recommendations on streams where utilization of target species could not be documented (see Appendix III and Appendix IV). This may include electro-fishing and/or spawner surveys lasting as long as two brood cycles (e.g. six years for coho). Level 3 evaluation is geared to measure the actual increase in production realized on a small number of selected streams over a long term.

It should be noted that Level 1 and Level 2 project evaluations are not designed to estimate resident or anadromous population size in target streams. Further, it is not an escapement estimate, and is not an enumeration of smolt production. Procedures such as these are site specific, detailed, and expensive salmonid studies beyond the current scope of this project. The evaluations are intended to identify the presence or absence of target species in a stream where fish passage is being scrutinized.

Purpose and Intent

WDFW evaluates completed projects to assure they are successful in achieving free and unobstructed fish passage. After constructing a fish passage project with dedicated funding a one year guarantee period allows for observation of conditions during winter flows when fish typically use the facility. We observe hydraulic conditions in the fishway and foot survey stream reaches above and below the project for adult spawners and/ or evidence of juvenile use (electro-fishing). During this time, if deficiencies in passability of the structure, or deficiencies that could reduce the normal expected project life are detected, plans are made to effect corrections. We have found that utilization of newly opened habitat is heavily influenced by adult spawner run strength which varies annually in response to an entire matrix of environmental and fish harvest conditions. Many species of salmonids such as coho and steelhead seek out cover and effectively avoid detection. These species also tend to disperse widely in stream systems making it difficult to observe them when numbers are low. In some cases, fish production in quality streams may be low due to many factors - including existence of the initial barrier culvert, low escapements, habitat problems in the target stream unrelated to the barrier, and inadequate time for fish production to cycle up on a stream blocked by a barrier culvert for many decades.

On Site Project inspection

An on site review consists of physical assessment by project team members to confirm that the new fishway is functioning as designed to freely pass fish. Any structural/fish passage deficiencies are identified and corrected during this time period which begins immediately after project construction and ends on December 31 the year following. All work within the first year after project inspection is classified as a Level 1 evaluation.

Adult Spawner Surveys

The primary objective for adult spawner surveys is to determine target species presence or absence above and below a newly completed WSDOT fish passage installation or to evaluate a WSDOT pre-project barrier. Spawner surveys are conducted for 500 meters above and below the project, or to the confluence with a larger body of water downstream, or to a natural barrier upstream. A belt chain is used to measure 500 meters upstream and downstream where surveyors tape is placed to mark the end of the survey area. Survey results are then recorded and copies forwarded to the WDFW Fish Management Program. If the reaches above and below the fishway are determined to be transport waters and local biologists indicate the likelihood of spawners elsewhere, the team relocates the survey accordingly. Pre- and post-project spawner surveys must be done (see Appendix II and Appendix III for results of adult spawner surveys).

Electro-fishing

Electro-fishing is primarily used to determine target species absence or presence above and below a newly completed WSDOT fish passage installation or to analyze a WSDOT barrier. It is intended to trigger appropriate action if for any reason fish are not responding to the barrier correction. If a project shows no fish use during the Level 1 evaluation (one year following completion of the project), the Level 2 evaluation begins a plan for recovery of target stocks so low in numbers that a practical, reasonable expectation for natural colonization is limited. This may continue for a period of six years depending on recovery of target species.

Juvenile electro-fishing and/or minnow trapping is used to determine target species presence if adult surveys indicate fish were found in extremely low numbers. An individual watershed approach is taken and problems associated with that specific watershed discussed by the SSHEAR evaluation team. An approach to fish recovery, if needed, is then prescribed for the specific stream being evaluated.

Generally, electro-fishing is done without block nets and within the first three pools or riffles above and below the culvert. Exceptions are made in those cases where known, high quality habitats that are more likely to hold juvenile fish, exist in areas other than this reach.

The primary result of juvenile studies is to verify fish use in streams where adult surveys have not verified adult use. These data, along with physical habitat information, are used by the

with the stream in question are determined by the evaluation team. Details on the approach, level, intensity, and location of the evaluation are determined by the team.

Results and Discussion

In streams evaluated, fish showed a wide variety of responses to new fish passage facilities. It is important to note some fish runs are extremely low in Washington, and will take time, possible further enhancement effort, and key habitat and harvest management decisions for fish populations to rebuild. As expected, some newly opened habitats were immediately taken advantage of by fish populations, while others showed no measured recovery. Adult surveys, the primary evaluation technique, revealed 14 of the 21 new fishways had upstream escapement after project completion. Of the 13 fishways where electro-fishing was conducted, 6 were determined to have a significant population of target species above the new fishway, 7 did not and were determined to require further monitoring.

Streams not being utilized will be re-sampled for fish presence in subsequent brood years. If fish populations are not recovering, further steps will be taken to rebuild the depressed stock. Steps might include further analysis of upstream or downstream barriers, selective debris removal, fencing, beaver dam notching, repair of other human-made barriers in the system, or channel roughening in bedrock sections. The primary method reestablishment of extirpated fish stocks will be supplementation (fry or fingerling planting). A recommendation to pursue recovery using supplementation will be made to the WDFW Fish Management Program, if the Level 2 evaluation process shows a fish stock is not recovering on its own.

Six Year Planning Document

At the request of WSDOT, WDFW has prepared a prioritized list of projects to be implemented over the next three biennia. This list is the result of further project evaluation, development of on-site engineering plan, conceptual designs, and budgeting. The WSDOT fish passage project six year plan is included in Appendix VI.

2007-2026 Budget Update

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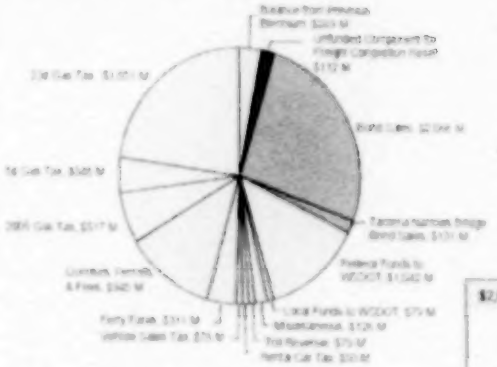
WSDOT Statewide Construction Engineers Meeting
29 May 2008

Washington State Department of Transportation

Cause No. C70-9213, Sub. 01-1
Plaintiffs' Exhibit **AT-100**

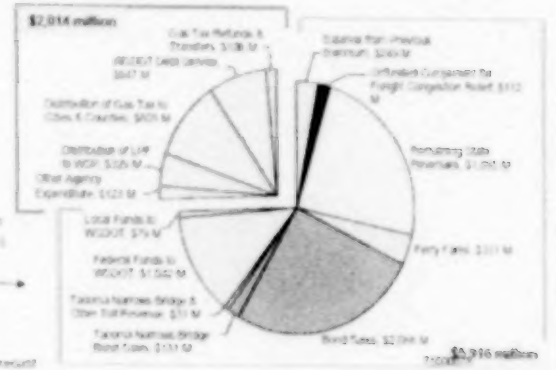
2007 - 2009 Enacted Budget

Transportation Revenues and Funds Collected by the State 2007-09 • $7.9 billion



Funding for transportation comes from a variety of sources, including fuel taxes, licenses, permits, and fees, ferry fares and concessions, rental car taxes, and miscellaneous revenues like interest earnings. A portion of the budget is also funded from bond sales, federal funds, and local funds and remaining cash balances from previous years.

Distribution of State Collected Transportation Revenues and Funds 2007-09 • $2.0 B to other agencies and governments, $5.9 B retained by WSDOT



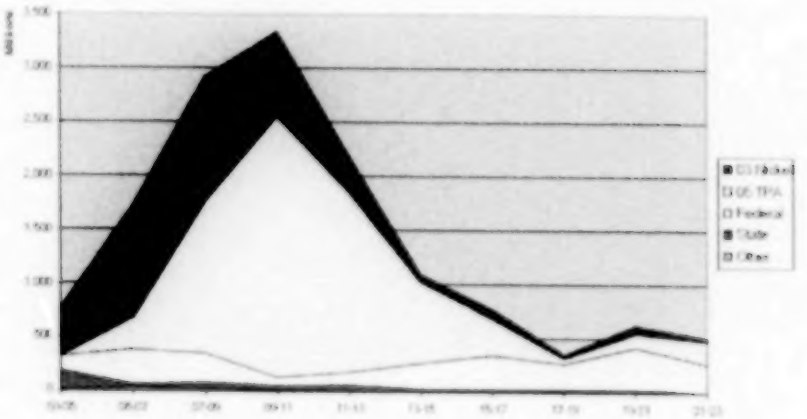
Out of the total collected funds, distributions are made to various agencies and governments. During the 2007-2009 biennium, of the estimated $7,930 million in transportation funds collected, WSDOT retains approximately $5,916 million. The remaining $2,014 million is distributed to cities and counties, the Washington State Patrol, the Office of the State Treasurer (to pay debt service), and other agencies.

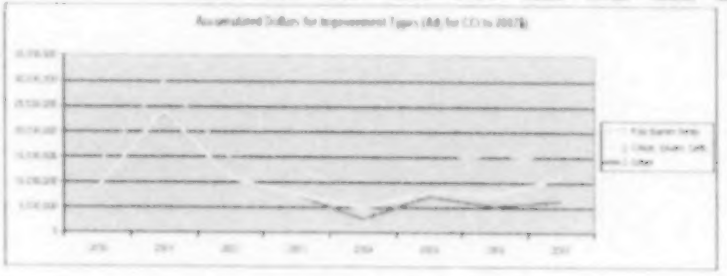
Revenue projections based on the June 2007 Transportation Revenue Forecast

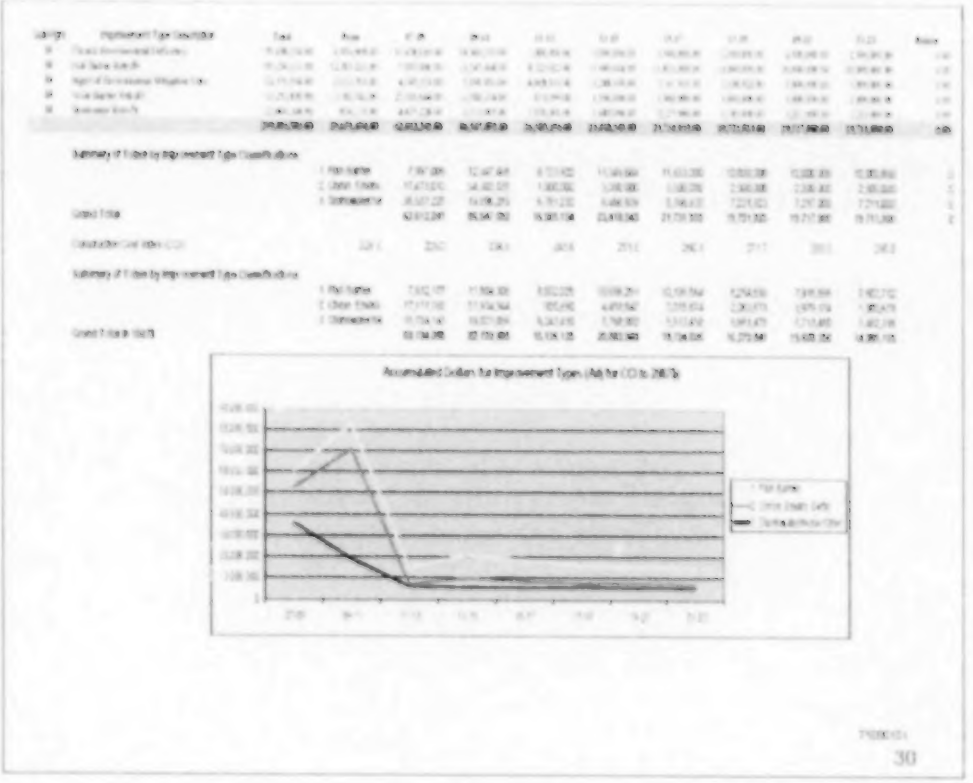
TPA & Nickel Revenue Package Projects

20-year Investment

Governor Proposed 2008 Supplemental Budget Request

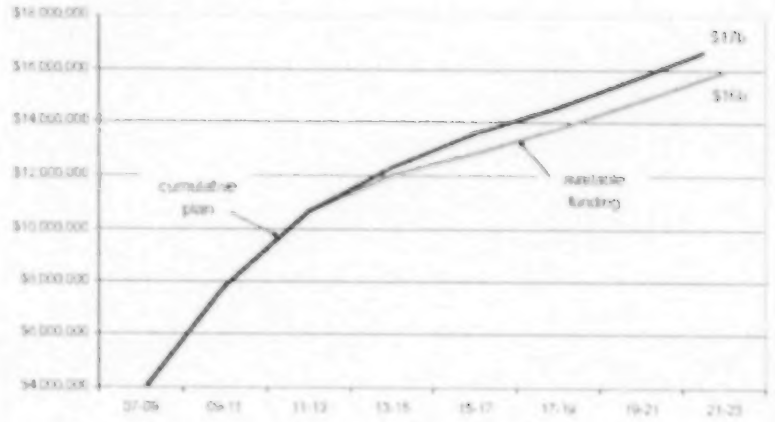


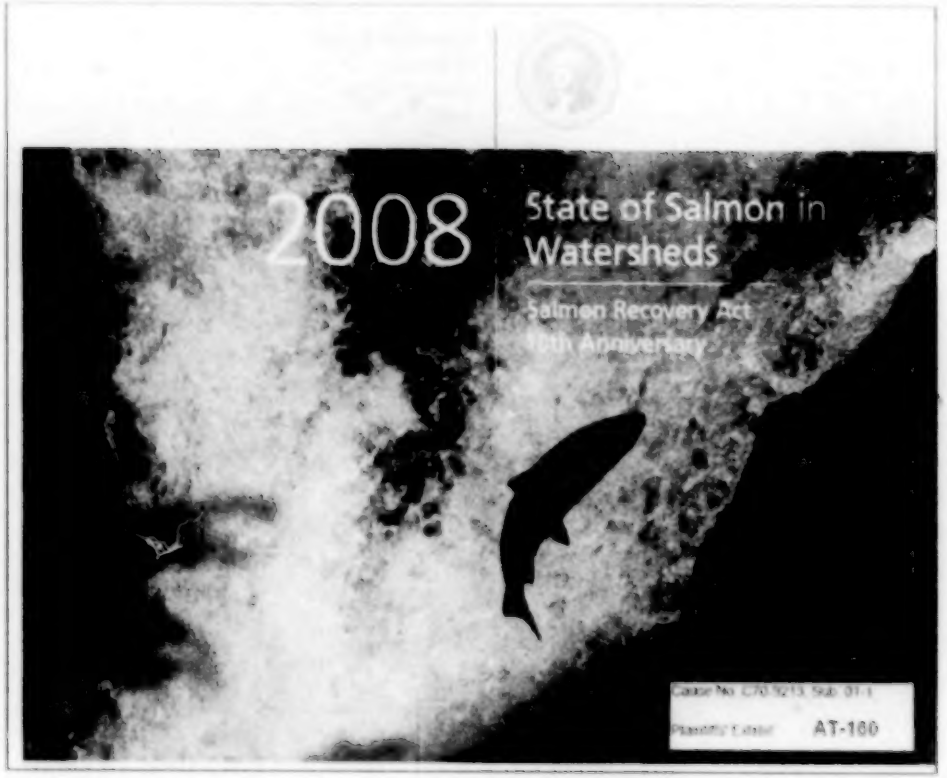



Accumulated Dollars for Improvement Types (All for CO to 2007)

Highway Const. Program Plan vs. Available Funding

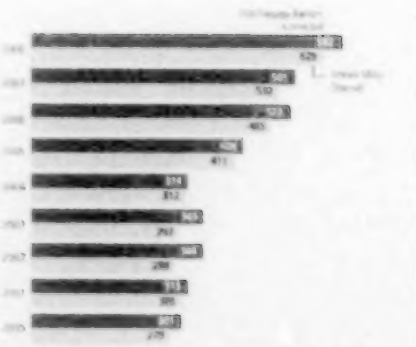
Governors proposed 2008 Supplemental Request

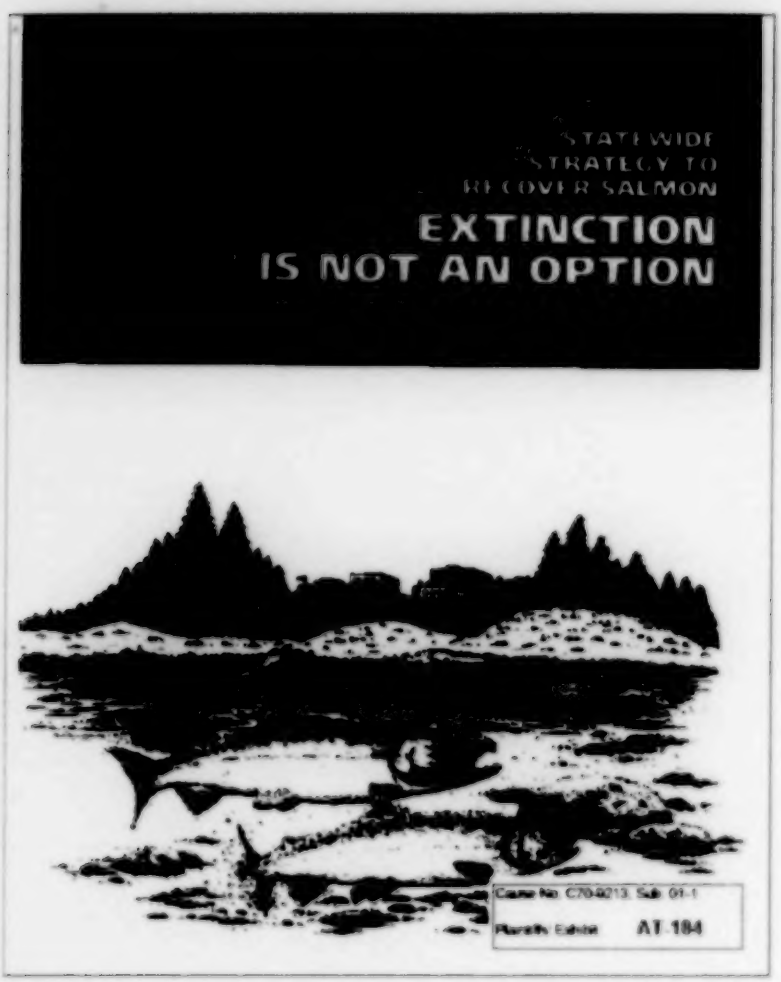



2008
State of Salmon in Watersheds
Salmon Recovery Act
10th Anniversary
AT-160

Water Quality in Watersheds

Fish Passage Barriers Corrected and Stream Miles Opened




STATEWIDE
STRATEGY TO
RECOVER SALMON
EXTINCTION
IS NOT AN OPTION
Case No. C704213, Sub. 01-1
Plaintiffs Exhibit AT-184

I. A Sense of Urgency

Overview

Salmon, steelhead and trout[1] have been, and continue to be, a critical part of Washington's history, culture, economy and recreational enjoyment. They are a basic and important natural resource, a symbol of the natural beauty of the state. Salmon are also valued for subsistence, for nutritional health and for the spiritual well-being of tribal people.

Salmon have been vital to the sport and commercial fishing industry. Fishing provides jobs, supports businesses, and provides quality recreational experiences for a significant number of families from Washington, around the country and the world. For example, the U.S. Department of Commerce estimates that in 1996 sport fishing contributed more than $704 million to Washington's economy. The decline of salmon is affecting families, communities, the state and the northwest region as a whole. The loss of salmon also means the loss of revenue for tribal economies historically dependent on salmon.

Much has been written on salmon biology and their environmental needs and the increasingly adverse impacts on salmon populations and habitats caused by human activities. (See Chapter VII. C. for list of references.) Elsewhere in this document you'll find basic information on salmon problems and the potential consequences of the listing of the salmon as endangered or threatened under the federal Endangered Species Act. This chapter conveys the importance of taking actions now by preventing further harm to salmon populations and habitats, and by implementing long-term conservation measures and programs to reverse the decline and recover the salmon.

An Indicator of Quality of Life

Salmon life history takes them through many ecosystems - riverine to estuarine to marine and back again. Salmon are important indicators of the aquatic and riparian ecosystems they inhabit. The well-being of salmon is also an indicator of the health of many other species, as well as an indicator of the environmental quality and health of ecosystems. This includes indications of health for human uses, from drinking water to swimming.

Sustained salmon productivity can be maintained only if diverse biological communities and genetic diversity of salmon are maintained, and watersheds and ecosystems are healthy and properly functioning. The basic needs for salmon spawning, rearing and migration are:

- adequate amounts of cool, clean and well-oxygenated freshwater;
- fully functioning riparian corridors with large woody debris in the stream channel.

[1] For the purposes of the Strategy, the term "salmon" will be used to refer to all species of salmon, steelhead, trout and char native to Washington State.

- high quality estuarine, nearshore and marine habitats;
- adequate supply of food, cover and refuge from predators;
- unimpeded access to and from freshwater.

Unfortunately, human activities have altered most, if not all, of these basic needs. Salmon are battling for survival, with their populations and habitats either at critical levels or at risk. Many wild salmon stocks have been significantly depleted and are being driven to or near extinction.

A Symbol in Decline

Salmon populations were historically numerous and abundant in the rivers of the state and along the Pacific Coast. The Columbia River with 1,210 miles was the greatest producer of wild salmon in the nation, with 10 million to 16 million salmon produced annually. Salmon runs now range from 3.2 million to less than a million, 75% of which are from hatcheries.

Fluctuations in the abundance of salmon have been observed for several decades. While some of the declines are normal and reflect the natural variation in ocean, freshwater and estuarine environments, human activities have severely accelerated the rate of decline of several salmon populations. For more than two decades scientists and fisheries experts have warned of the decline of salmon and the degradation of their ecosystems. Various stock status reviews have noted the decline of salmon in Washington. For example, the 1993 Salmon and Steelhead Stock Inventory (SASSI) stated that less than 50% of Washington's salmon stocks were in a healthy state. As defined in SASSI, a healthy stock is one "experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock." Generally, coastal populations currently tend to be better off than populations inhabiting interior drainages. Losses of stocks in inland areas of the Columbia River system have occurred over a greater percentage of their range than species primarily limited to coastal rivers.

Stress Factors

Declines of wild salmon closely parallel the settlement of the Pacific Northwest by Euro-Americans, starting in the early 1800s. For more than a century, people degraded and destroyed streams, rivers and estuaries by farming, logging and developing land and water; over-fished; introduced non-native species; and substituted hatchery-produced fish for wild fish.

Unfavorable natural conditions contributed additional stress. It is important to note that the effects of natural disturbances (e.g., droughts, fires, volcanic eruptions) are quite different from the effects of human-caused factors. Natural disturbances are usually relatively short in duration and occur on an infrequent basis. While human factors may contribute minimal impacts individually, the number, magnitude, duration, and cumulative impacts since settlement combine to form the primary cause of the decline of numerous salmonid stocks.

The degradation or modification of habitat conditions by human activities influences salmon growth, reproduction, migration, demand for food and other biological and physiological functions. For example, alteration of stream flows can interfere with upstream migration of adults, and reduce or eliminate stream rearing and spawning habitats. Many of the human impacts are interrelated and

are cumulative in their effect. For example, a heavily over-fished stock has fewer spawners and is far less able to adapt to changing habitat conditions related to land use practices, such as urbanization or logging. Dams that block access to large areas of upstream habitat may fragment and reduce the genetic and biological diversity of a species in a basin to the extent that it may be unable to withstand further impacts from fishing, poor land use practices or interbreeding with hatchery fish.

Human factors have taken place over a long period of time and have affected particular salmon stocks or watersheds to varying degrees. Future population growth - projected by the Office of Financial Management (OFM) to increase by 36% between now and 2020 - and its associated continued urbanization and land disturbances will more likely expand the geographical extent and intensity of habitat loss.

These human factors are addressed in the Statewide Strategy to Recover Salmon in terms of the "four H's" - habitat, hydropower, harvest and hatcheries. By keeping the strategy focused on key human activities and actions (e.g., forest practices, agricultural practices, fish harvest, etc.) we hope to focus attention on the effects of those activities and the changes we need to make to protect and restore salmon and watershed health.

ESA Listings of Salmon: Difficult Issue for All

The protection of salmon populations and habitat occurs under several federal and state laws. Unfortunately, the decline and continuing losses of salmon stocks, as well as diminished abundance and genetic diversity, is evidence that some of the laws are either inadequate or not fully implemented and enforced. The declining status of many salmon species and populations has resulted in their listing as either endangered or threatened under the federal Endangered Species Act (ESA).

The listings of anadromous fish present new and difficult issues for the state, particularly in the heavily populated Puget Sound area, and there is little historical precedence or experiences upon which to draw. Now, or in the very near future, key regulatory mechanisms of the ESA, such as prohibition against taking or harming a listed species, (which includes significant habitat modification or degradation), may be triggered. This will require all of us to change our behavior, from how we water our lawns to how we grant approval to new projects.

In summary, salmon play a critical role in our economy and way of life. But they are facing an uphill battle for survival. No specific factor is solely responsible for the salmon problem. Salmon have evolved to withstand natural disturbances such as floods, drought, predation and ocean cycles. However, these disturbances are often accelerated by human factors. Given that the stresses to fish populations posed by low points in natural ocean productivity cycles can occur over a decade or more, continually shrinking freshwater habitat presents very serious risks. In addition, many human factors contribute directly to the salmon problem, such as forest and agricultural practices, water use and development, intensive and continued urbanization, fish harvest and hatcheries. The listings across 75% of the state are cause for great concern, and will have direct consequences for any actions taken that might harm the species or its habitat.

Update on Anadromous Fish Passage Culvert Barriers on Forest Service Roads within the US v. Washington Case Area

Bob Metzger
Aquatic Program Manger
Olympic National Forest, USDA Forest Service
July 1, 2009

Fish passage barrier inventories were initiated by National Forests throughout the Pacific Northwest Region in 2000 to collect initial information on potential culvert fish passage barriers on Forest Service roads. As of 2002, preliminary results identified 65 culverts within the case area that blocked access to ¼ mile or more of anadromous habitat. These culvert barriers blocked access to a total of 35.2 miles of anadromous habitat. Additional inventories since 2002 have provided more detailed information about potential fish barrier culverts within the case area and have caused some initial barriers to be deleted and some other sites to be added.

The Forest Service has implemented an aggressive program to correct culvert fish passage barriers throughout the Pacific Northwest Region. New crossing structures are designed to meet stream simulation standards to provide passage for all species and all life stages of fish by Regional direction. The 2005 MOU between WDFW and the Forest Service Regarding Hydraulic Projects Conducted by Forest Service in Washington State also requires the use of the stream simulation approach for new culverts on fish-bearing streams. Site investigation and selection of appropriate stream simulation designs are guided by the 2008 Forest Service document *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings*.

Where road segments that contain the culvert fish passage barriers are no longer needed, fish passage barriers are corrected by removing the crossings altogether and decommissioning the roads. In some cases, storms have washed out the barrier culverts and restored access for anadromous fish. Fish passage structures will be installed at these sites if the flood damage is repaired.

Fish passage has been restored at 36 anadromous culvert fish passage barriers on Forest Service roads within the case area since 2002. Completed culvert barrier correction projects are reported annually to WDFW and to the US Army Corps of Engineers as part of our Hydraulic Projects MOU and Corps 404 Permit RGP for Forest Service Fish Projects in Washington State, respectively.

There are currently 27 culvert fish passage barriers within the case area that block more than ¼ mile of anadromous habitat. These culverts block access to a total of 19.3 miles of anadromous habitat.

Table 1. Anadromous Culvert Fish Passage Barriers within case area

Forest	# Culvert Barriers	Habitat Blocked	
Olympic	5	8.7 miles	
Mt Baker-Snoqualmie	22	9.6 miles	
Gifford Pinchot	0	0	No anadromous culverts within case area
Okanogan-Wenatchee	0	0	No fish culverts within case area
Total	27	19.3 miles	

At least three anadromous culvert barrier correction projects have been funded and will be implemented within the case area in FY 2009 or 2010. Two anadromous barriers will be removed on the Olympic National Forest. One culvert will be corrected on the Mt. Baker- Snoqualmie National Forest. These projects will reestablish access to another 5.1 miles of anadromous habitat. Additional culvert barrier corrections are in the planning and design phases on both Forests and will be implemented as funding is available.

Design of Road Culverts for Fish Passage

2003

USFWMA/SUPP 002140

Design of Road Culverts for Fish Passage

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Guiding Principles for Water Crossings

1. Culverts result in permanent, direct loss of instream and riparian habitat.

2. Installation and maintenance of water crossings that confine or constrict the channel or floodplain will break ecological connectivity, alter channel processes and change adjacent channel character and shape by affecting the movement of debris, sediment, channel migration, flood waters and aquatic and terrestrial organisms.

3. Water crossings may create an entry point for road runoff pollutants.

4. Fish passage can be hindered or blocked at water crossings.

5. Water crossings increase the risk of damage to the downstream habitat due to water crossing failure.

6. Cumulative impacts and risks of water crossings can be avoided or minimized by consolidating water crossings, employing full-span bridges, by simulating a natural channel through culverts or removing water crossings. Access solutions that do not require water crossings are preferred.

It is our nature as human beings to live, work and recreate along and adjacent to waterways, whether freshwater or marine. Our lives and histories are inextricably linked to water. How we affect those waterways has long term survival consequences not only for fish and wildlife, but for humanity. The Aquatic Habitats Guidelines Program is intended to help balance man's need to protect life and livelihood with the need to protect and restore riparian habitat for fish, for wildlife and for ourselves.

Introduction

Design of Road Culverts for Fish Passage serves as a guide for property owners and engineers who are designing permanent road-crossing culverts to facilitate upstream fish migration. It provides guidance for projects involving new culvert construction as well as retrofitting or replacing existing culverts. The designer will need to have a working knowledge of hydraulic engineering, hydrology, and culvert structural engineering to accomplish an appropriate design.

Formal fish ladders may be required as a retrofit at some culvert sites to provide passage. The design of fish ladders is beyond the scope of this guideline, though there is a brief description of some basic design concepts included here. An engineer with expertise in fish passage should be consulted for additional assistance for the design of fish ladders.

Design of Road Culverts for Fish Passage lays out the consecutive design steps most likely to be required in a culvert project. A form describing the data needed for the design and its evaluation is provided in Appendix F, *Summary Forms for Fish-Passage Design Data*. Explanations and definitions of terms describing channel, hydrology and data requirements can also be found in Appendix F.

Before using this guideline, great care should be taken to determine whether a culvert is a suitable solution for providing fish passage at the particular site in question. Indeed, environmental circumstances other than fish passage may make it impossible to obtain a permit to install a culvert. The Washington Department of Fish and Wildlife prefers construction of a bridge over installation of a culvert in order to minimize risk of impacts to fish and habitat. Wherever a roadway crosses a stream, it creates some level of risk to fish passage, water quality or scientific aquatic or riparian habitats. Generally, the risks increase the more the roadway confines and constricts the channel and floodplain. Any and all alternatives should be investigated to minimize the number of sites where a roadway crosses a stream, including designing road alignments to avoid crossings, consolidating crossings and using temporary crossing structures for short-term needs.

Though this guideline focuses on fish passage, other habitat and ecological considerations are also required in the siting and design of road-crossing structures such as culverts. These considerations are essential to the protection of fish and habitat, and should be addressed first in the design of a road crossing. Requirements addressing these considerations are outlined in Chapter 1, *Habitat Issues at Road Crossings*. The Washington Department of Fish and Wildlife's Area Habitat Biologist in the area where your project is located is the first authority for Hydraulic Project Approval, so be sure to make contact early on for information on fish passage and other environmental issues that go beyond fish passage (see Appendix J, *Washington Department of Fish and Wildlife Contact Information*).

For information about the inventory of culverts or the prioritization of culvert barrier remedies, refer to the *Fish Passage Barrier Assessment and Prioritization Manual*, published by the Washington Department of Fish and Wildlife (1999).

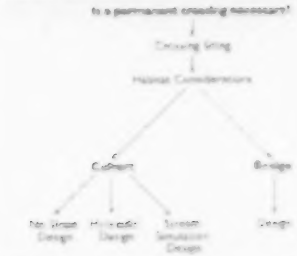
The design of new or retrofit culverts must be in compliance with Washington Department of Fish and Wildlife fish passage criteria as defined by WAC 220-110-070 (see Appendix B, *Washington Culvert Regulations*). The information contained in this publication is the most current guidance for construction and retrofit of culverts for fish passage in Washington State. Recommendations in this publication vary somewhat from WAC 220-110-070 but do not conflict with it. *Design of Road Culverts for Fish Passage* is intended to clarify the regulation and provide up-to-date guidance and application of the regulation across a broader range of fish passage projects, including steep culverts. These guidelines can be applied as provided for in WAC 220-110-012, "Modification of technical provisions." Information gathered, as well as concepts and guidance developed for this publication will be incorporated into any future review and update of WAC 220-110-070.

Chapter 1 – Habitat Issues at Road Crossings

The very presence of a culvert has an impact on stream habitat, even when fish are able to migrate through it successfully. These impacts are often associated with the culvert itself, but they can also be associated with the channel modifications necessary to install or retrofit a culvert intended to facilitate fish passage. Upstream and downstream hydraulic effects of the culvert can have an impact as well. There are, for example, often habitat losses associated with steepening a channel to achieve fish passage. What's more, though fish-passage criteria apply only to fish-bearing streams, other environmental factors apply at all crossings. For questions about habitat issues, contact the Washington Department of Fish and Wildlife's Area Habitat Biologist (see Appendix J, Washington Department of Fish and Wildlife Contact Information).

Because the impact to stream habitat can be significant, the best option for roadway design is to avoid or minimize the number of stream crossings needed. However, this is not always feasible, so other options must be considered that will allow the stream to cross the road. **Figure 1-1** presents a generalized approach to selecting road-crossing options. As you can see, it explores options other than permanent culverts and addresses habitat issues that may arise before considering the formal culvert design process.

Figure 1-1. Road Crossing Design Process



A generalized approach to selecting road-crossing options.

Once the culvert option has been identified, a number of concerns must be taken into account as design begins. These concerns may dictate the siting, sizing and design of culverts and/or fish passage improvements:

- direct habitat loss
- water quality
- upstream and downstream channel impacts
- ecological connectivity
- channel maintenance
- construction impacts, and
- risk of culvert failure.

Direct Habitat Loss

Salmonid habitat includes all areas of the aquatic environment where the fish spawn, grow, feed and migrate. Culvert installations require some magnitude of construction activity within the stream channel and the culvert itself replaces native streambed material and diversity with the culvert structure.

Spawning Habitat

Each species of salmon and trout requires specific spawning conditions related to the water velocity, depth, substrate size, gradient, accessibility and space. All salmonids require cool, clean water in which to spawn. Most salmonid spawning occurs in pool tailouts and runs. Spawning habitat can be lost or degraded by culvert installations in the following ways:

- Culvert placement in a spawning area replaces the natural gravel used for spawning with a pipe. This is a direct loss of spawning habitat.
- Culvert construction can require significant channel realignment, eliminating natural meanders, bends, spawning riffles and other diversity in the channel that serve as valuable habitat.
- Culverts shorten channels, leading to increased velocities and bed instability that reduce spawning opportunities and decrease egg survival.
- Riffles and grade bars immediately downstream of the culvert can be scoured if flow velocity is increased through the culvert. Gravel mobilization while eggs are incubating in redds nearby results in high egg mortality.

- Any release of sediment into the stream (not simply covering gravel with silt). In the case of culverts, sediment releases may be due to construction or due to a change in hydraulics caused by changes to the alignment, sizing or design of the culvert. Such damage can be avoided or at least minimized by correctly designing and implementing an effective erosion- and sediment-control plan and by timing the project to avoid critical stages in salmonid life cycles. Instream work windows vary among fish species and streams. Contact the Washington Department of Fish and Wildlife's Area Habitat Biologist for information on work windows (see Appendix J).

Rearing Habitat

Juvenile salmonids use almost all segments of the stream environment during some stage of their freshwater residence. Habitat usage is highly variable depending upon the species, life stage and time of year. Pools with large, woody debris are especially valuable habitat. Trees on the streambank also provide important habitat features, serving as cover and a source of insects and large woody material, both of which critical to rearing fish. Culvert construction can negatively impact rearing habitat in the following ways:

- There is a direct loss of rearing habitat when it is replaced with a pipe.
- Trees and woody debris at the culvert site must be removed to install the culvert, thus eliminating their beneficial effects on channel structure, function, stability and food production.
- Riparian vegetation must be removed from the streambank to make way for the culvert installation, and it is often removed for the entire right-of-way width as a regular maintenance activity.
- Any reduction in stream length is a reduction in usable rearing habitat. Culverts cut off natural bends, meanders, side channels and backwater channels, directly eliminating such habitat. Most side channels and backwater channels experience higher fish usage than the main stream channel, especially during winter flood flows, so the loss of such habitat can be especially harmful to fish survival.
- Culvert placement that lowers the natural water level of pools, ponds, backwaters or wetlands within or adjacent to the stream can significantly decrease valuable rearing habitat.

Loss of Food Production

Fish, like all other organisms, need food in order to survive, grow and reproduce. Juvenile salmonids feed on aquatic invertebrates and terrestrial insects that fall into the water. The food chain in the aquatic environment begins with the primary producers like algae and diatoms (periphyton), which require organic material and sunlight to fuel the photosynthetic process. The inside of a culvert is dark, and the absence of sunlight prohibits primary production. Benthic invertebrates like mayflies, stoneflies and caddis flies feed on the primary producers. Invertebrates require some of the same conditions as salmonids to thrive, including clean water and stable gravel. Reduction in the number of invertebrates means a reduction in an important food source for salmonids, which can reduce salmonid growth rates. Faster growth rates produce larger salmonids – a competitive advantage that increases their survival rate at sea.

Removal of riparian vegetation for culvert placement reduces organic debris such as leaves, wood, bark, flowers and fruit that enters the stream and fuels primary production. Terrestrial insects that drop from overhanging vegetation into the water are removed from the food base when the vegetation is lost.

Mitigation of Direct Habitat Losses

Complete replacement of habitat and channel length lost due to culvert installation can be difficult, if not impossible. Mitigation then becomes the next option. Mitigation for the impact of lost cover and pools might include adding diversity and habitat features such as woody debris to the channel in an appropriate location.

As mentioned earlier, placement of a culvert in a spawning area results in a direct loss of that habitat for fish, but invertebrates are also affected because they, too, thrive in gravel beds. Spawning habitat in most Pacific Northwest streams is not limited by the supply of gravel; it is limited by the structure and diversity of channel forms that sort and distribute bed material to create spawning and other habitats. The only effective means of preserving valuable spawning habitat in most cases is to avoid disturbing it in the first place.

In streams that are deficient in spawning gravel, a loss of spawning habitat might be mitigated off site by gravel supplementation. Several techniques might be used.

While it may be tempting to simply place new gravel over an existing streambed inside or outside of a culvert, it is normally not effective to do so in the short term. The new gravel is of course attractive to fish for spawning, but it is not stable.

enough for eggs to survive winter floods. It takes several high flows for gravel to be redistributed and settle into place before it can be valuable habitat.

Gravel supplementation should instead be done in a way that mimics natural gravel deposits such as pool tailouts or gravel bars. The downstream end of stable pools and stable riffles can be supplemented with a layer of gravel to mimic tailout deposits. Gravel can be placed upstream of streambed controls that are installed as part of the fish-passage project. A channel constriction made of mounds of gravel will, in the right circumstances, create a pool and a tailout. Gravel can also be supplied to a bankline to mimic a naturally eroding gravel bank. High stream flows will then efficiently redistribute the gravel to locations where it is most likely to remain stable.

It may seem reasonable to add a layer of gravel inside steeper culverts to mimic the streambed at either end. However, if the gravel layer is too thick, low water flows may not be able to rise above the gravel, and fish will not be able to swim through. This problem can be especially troublesome when there is no input of sediment from upstream to seal the gravels, such as when there is a wetland or pond immediately above the culvert or in spring-fed streams with stable hydrology.

Water Quality

To extend the life span of culverts in acidic water, they are sometimes treated with an asphalt coating. It is unknown what effect this may have on fish or invertebrates in the water. Until it can be shown that these type of treatments are not a risk to fish health they should not be used.

Quality and quantity of road stormwater runoff must be mitigated as deemed appropriate by the local jurisdiction or the Washington State Department of Ecology. In addition, all stormwater discharges into a stream must be designed to prevent scour during higher flows.

Upstream and Downstream Channel Impacts

Increased velocity from a culvert can erode downstream banks, leading to the need for bank protection. To reduce the likelihood of downstream erosion, flow velocity at the culvert exit should not exceed the pre-project channel velocity by more than 25 percent.

Undersized culverts create bed instability upstream. At high flows, the culvert creates a backwater, and bed material is deposited in the channel upstream. When receding flows, the bed and/or banks erode through or around the deposition. The result is either a chronically unstable channel bed or increased bank erosion and the need for bank clearing and protection. The culvert inlet should be designed to limit head loss to less than one foot for a 10-year flood. Less head loss may be necessary considering flood impacts.

The design process described in this guideline helps minimize these upstream and downstream impacts. Typically, this process determines the size and elevation of culverts such that velocities leaving the culvert will not be excessive. Sites with banks or beds susceptible to erosion may require special consideration.

A culvert placed in a stream with an actively migrating channel can result in an acceleration of the channel migration and a substantial maintenance effort to keep the channel at the culvert location. Channel migration is a natural geomorphic process, but upstream activities can accelerate it. Chapter 7, *Channel Profile*, discusses how to anticipate and address these impacts.

Ecological Connectivity

Ecological Connectivity is the capacity of a landscape to support the movement of organisms, materials or energy.[7] In terms of culvert design, it is the linkage of organisms and processes between upstream and downstream channel reaches. The health of fish populations, therefore relies on the health of their ecosystems, which include migrations and processes that depend on that connectivity. Biotic linkages might include upstream and/or downstream movement of mammals and birds, non-targeted fish species and the upstream flight and downstream drift of insects. Physical processes include the movement and distribution of debris and sediment and the shifting of channel patterns. Some of these functions may be blocked by road fills and culverts that are too small in relation to the stream corridor.

Debris and bed material should be managed by allowing them to pass unhindered through the culvert. When debris is trapped, fish-passage barriers are created, the debris is not passed to the channel downstream, and a backwater is created upstream that extends the negative effect of the culvert. While the size of the culvert developed by the design processes described in this guideline will normally be adequate to pass most debris and bed material, there may be special cases where the culvert size should be increased to avoid capturing debris. Additionally, the Hydraulic Design Option discussed later in this guideline may undersize the culvert for debris, so a factor of safety must be applied.

Twin culverts and multiple parallel culvert pipes are generally not acceptable because they trap debris, create barriers to fish migration and increase the risk of culvert failure. In the case of low road profiles, raising the road elevation should be considered as an alternative to multiple culverts.

Debris racks might be a reasonable, temporary solution in special cases, if an existing culvert has a high risk of debris plugging and there is a clear responsibility and committed schedule for replacing the culvert. The debris rack for this situation should be mounted high on the culvert, above the ordinary high water mark. The space below it is left open for typical flows. The rack itself is only functional at high flows when debris is moving. Openings within the bar rack should be no smaller than nine inches. A specific monitoring and maintenance plan should be developed for any debris rack, and convenient access must be provided for these activities.

Ecological connectivity issues are difficult to quantify and generalize, but they may ultimately be significant to the health of aquatic ecosystems. More development of the concept of ecological connectivity in relation to road culverts is expected and encouraged.

Channel Maintenance

Other than fish passage, the need for channel maintenance created by poor siting of road crossings and culverts is the greatest impact culverts have on aquatic habitats. Highways are often placed at the fringe of river floodplains and must, therefore, cross the alluvial fans of small streams entering the floodplain. As each stream enters the relatively flat floodplain, a natural deposition zone is created, and the channel is prone to excursions and avulsions across its alluvial fan. Culverts placed in these locations tend to fill with bed material. To keep the culvert from plugging and the water overtopping the road, periodic (in some cases as frequently as annually) channel dredging becomes necessary. Bed-material removal is a major cause of channel instability and loss of spawning and rearing habitat for some distance upstream and downstream. It also has an ecological connectivity impact by blocking bed material and the aggrading channel process from migrating throughout the reach.

Mitigation for these channel maintenance impacts includes installing a bridge or a culvert large enough that the aggradation and channel-evolution processes can continue. A bedload sump might be useful in some situations to localize the dredging needed at existing culverts and even eliminate the upstream impacts of dredging. (Information on the design of such sediment traps can be found in the upcoming Washington Department of Fish and Wildlife document, Stream Habitat Restoration Guidelines.) Removing the road is usually the most expensive, but is normally considered a superior alternative.

Construction Impacts

Construction impacts might include the release of sediments or pollutants, temporary fish passage barrier during construction, removal of bankline vegetation, blocking of the flow or stranding of fish. Provisions in WAC 220-110-070 address these issues by way of construction timing, water-quality management, erosion- and sediment-control planning, and revegetation. Construction plans submitted for Hydraulic Project Approval should include, in addition to plans and specifications, an erosion- and sediment-control plan covering these items. The provisions of WAC 220-110-070 may be modified for specific projects.

Risk of Culvert Failure

Structural failure of culverts can cause long-term, extensive and massive damage to habitat. Failures can be a result of inadequate design, poor construction, beaver damming, deterioration of the structure or extreme natural events. Risk of failure can be minimized by sizing the culvert to accommodate extreme flow events and debris. This may include appropriate inlet and/or outlet armoring and the use of proper backfill and compaction techniques during construction.

In some cases, fords or alternative road overflow points may be useful. They should be considered along forest roads that are susceptible to debris flows or along roads that cross alluvial fans (for guidelines on ford design, contact WDFW for Technical Assistance).

Chapter 2 – Fish Barriers at Culverts

The parameters provided in WAC 220-110-070 serve as the technical definition of a fish-passage barrier and the basis for fish-passage design. Some level of barrier is assumed to be present when the criteria are not achieved. The regulation is included in Appendix B, *Washington Culvert Regulation*.

Barriers block the use of the upper watershed, which is often the most productive spawning habitat, considering channel size, substrate and available rearing habitats. Fish access to upper portions of the watershed is important; fry produced there then have access to the entire downstream watershed for rearing. Complete barriers block all fish migration at all flows. Temporal barriers block migration some of the time and result in loss of production by the delay they cause (adult/mini salmonids survive only a limited amount of time in fresh water, and a delay can limit egg distribution or cause mortality). Partial barriers block smaller or weaker fish within a species and limit the genetic diversity that is essential for a robust population. Fish passage criteria accommodate weaker individuals of target species, including, in some cases, juvenile fish.

There are five common conditions at culverts that create migration barriers:

- excess drop at the culvert outlet;
- high velocity within the culvert barrel;
- inadequate depth within the culvert barrel;
- turbulence within the culvert; and
- debris and sediment accumulation at the culvert inlet or internally.

The interior surface of a culvert is usually designed to optimize water passage; it does not have the roughness and complexity needed to slow down the flow that a streambed does. Instead, the culvert concentrates and dissipates energy in the form of increased velocity, turbulence or downstream channel scour are the most prevalent blockages at culverts.

A culvert is a rigid boundary set into a dynamic stream environment. As the natural stream channel changes, especially with changes in hydrology due to land use changes, culverts often are not able to accommodate those changes. Instead, they become barriers to fish passage.

Fish-passage barriers at culverts can be the result of improper design or installation, or they may be the result of subsequent changes to the channel. Fish-passage barriers are very often the result of degrading channels, leaving the culvert perched above the downstream channel. Changes in hydrology due to urbanization are a common cause of channel degradation. Fish-passage barriers are also caused by scour pool development at the culvert outlet. The scour pool may be good habitat in itself but it moves the backwater control of the downstream channel further downstream and creates a drop at the outlet. The presence of large scour pools at a culvert outlet and/or mid-channel gravel bars upstream of the culvert are often indicators that a velocity barrier for fish exists inside the culvert at high flows.

All fish-passage structures require some level of maintenance. Adult fish typically migrate during the high flow seasons and in response to freshets. Timely inspections and maintenance during inclement weather are necessary at all facilities. When culverts are not adequately inspected and maintained, fish-passage barriers can form. The maintenance done at a culvert for the purpose of high flow capacity is often different than what is required for fish passage. For example, debris that is plugging slots in baffles for example may not affect the flow capacity of a culvert, but it may block fish from passing through. More than a cursory inspection of the culvert inlet and outlet is necessary for an adequate fish passage maintenance program.

Many fish passage barriers that occur at high stream flows are not apparent during low and normal stream flows. For a complete fish-passage assessment, culverts must be analyzed at both the low and high fish-passage design flows. Definition and selection of design flows are discussed in this guideline. The Washington Department of Fish and Wildlife has developed a spreadsheet to determine if a culvert meets the criteria in WAC 220-110-070. The spreadsheet can be found in the ***Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual***, published by the department and available at www.wdfw.wa.gov/hab/engineer/fishbarr.htm. The manual provides guidance on how to locate, assess and prioritize fish passage problems (e.g., culverts, dams, fishways) and problems associated with surface-water diversion screens.

Chapter 3 – Culvert Design For Fish Passage

Many road crossings in Washington State have been designed or retrofitted to provide fish passage. The experience of observing and monitoring such sites, together with research on fish migration behaviors and swimming capabilities, has led to several straightforward design procedures outlined in this guidance. Chapter 1, Habitat Issues at Road Crossings, addressed the first step in the design process, which involves becoming aware of the potential habitat issues that arise when roadways cross streams. Chapter 2, Fish Barriers or Culverts, identified some of the concerns to be addressed if culverts are to be used to convey a stream through a roadway crossing. This chapter and the rest of this guidance describe how to design a culvert to provide fish passage. A general flow chart of the culvert-design process for fish passage is shown in **Figure 3-1**.

Figure 3-1 Culvert Design for Fish Passage

A general flow chart of the culvert design process.

Design of Road Culverts for Fish Passage provides specific guidance to satisfy state regulations and to cover additional situations that exceed those defined by regulations. The criteria provided here are not absolute; however, if they cannot be achieved for a specific project, then other road crossing means should be considered instead. Such options may include installing a temporary culvert, rerouting the road to eliminate the stream crossing or constructing a bridge. Variances to some design criteria can be approved if adequate justification is provided.

Recent experience in western Washington has shown that about 25 percent of fish passage barriers at culverts have required full replacement of the culvert. Some of these replacements have been accomplished by boring new culverts through high road fills. About five percent have required retainment of the culvert with a bridge or abandonment of the roadway. These percentages will likely change as more culvert barriers are fixed in low gradient areas and projects move upstream to higher gradient reaches.

When culverts are the solution of choice, effective fish passage can often be provided through the proper determination of culvert slope, size, elevation and roughness. Constructing formal structures and allowing the upstream channel to regrade to a steeper gradient can also be useful. Fish passage construction at low gradient sites can usually be limited to within 100 feet or less of the channel length outside the culvert; construction at steeper sites may extend further upstream and downstream from the culvert, or it may require formal fish ladders or full culvert removal.

The determination of adequate fish passage at a culvert is based on criteria described in WAC 220-110-070. This regulation describes two different approaches for ensuring fish passage:

1. the No-Slope Design Option; and
2. the Hydraulic Design Option.

A third option is also acceptable: it is the Stream Simulation Design Option, in which an artificial stream channel is constructed inside the culvert.

The No-Slope Design Option results in reasonably sized culverts without requiring much in the way of calculations. The Hydraulic Design Option requires hydrologic and open-channel hydraulic calculations, but it usually results in smaller culverts being required than the No-Slope Design Option. (Smaller culverts may trap more debris, however, so a factor of safety must be applied.) The Hydraulic Design Option is based on velocity, depth and maximum-turbulence requirements for a target species and age class. The Stream-Simulation Design Option involves constructing an artificial stream channel inside the culvert, thereby providing passage for any fish that are able to migrate through the reach.

It is difficult in most situations, if not impossible, to comply with velocity criteria for juvenile fish passage using the Hydraulic Design Option. The No-Slope and Stream-Simulation Design options, on the other hand, are intended to be satisfactory for adult and juvenile passage; thus, they tend to be used more frequently at sites where juvenile fish passage is required. Application of the No-Slope Design Option is most effective for relatively short culverts in low-gradient sites.

Road-Crossing Siting

Fish-passage barriers and the cumulative habitat loss caused by culverts can be reduced in part by properly siting the culvert and by minimizing the number of road crossings. Both the siting of culverts and the land-use planning that creates the need for the culverts are important.

Culvert Siting

The goal in siting a culvert is to make the culvert as short as possible without deviating from the direction of the upstream and downstream channel course by more than 30 degrees. A culvert that mimics the exact course of a stream may be long enough to become a fish-passage barrier. On the other hand, a culvert made shorter by deviating the course of the stream at an extreme angle (greater than 30 degrees to the channel) will reduce the success of fish passage by increasing inlet contraction and turbulence at high flows. Increased contraction also makes the culvert less efficient for flood capacity and sediment transport. In-channel deposition and bank scour often occur upstream of culverts with excess skew. When the culvert is skewed relative to the downstream channel and the culvert outlet is not directed at the channel alignment, there is an increased risk of bank erosion.

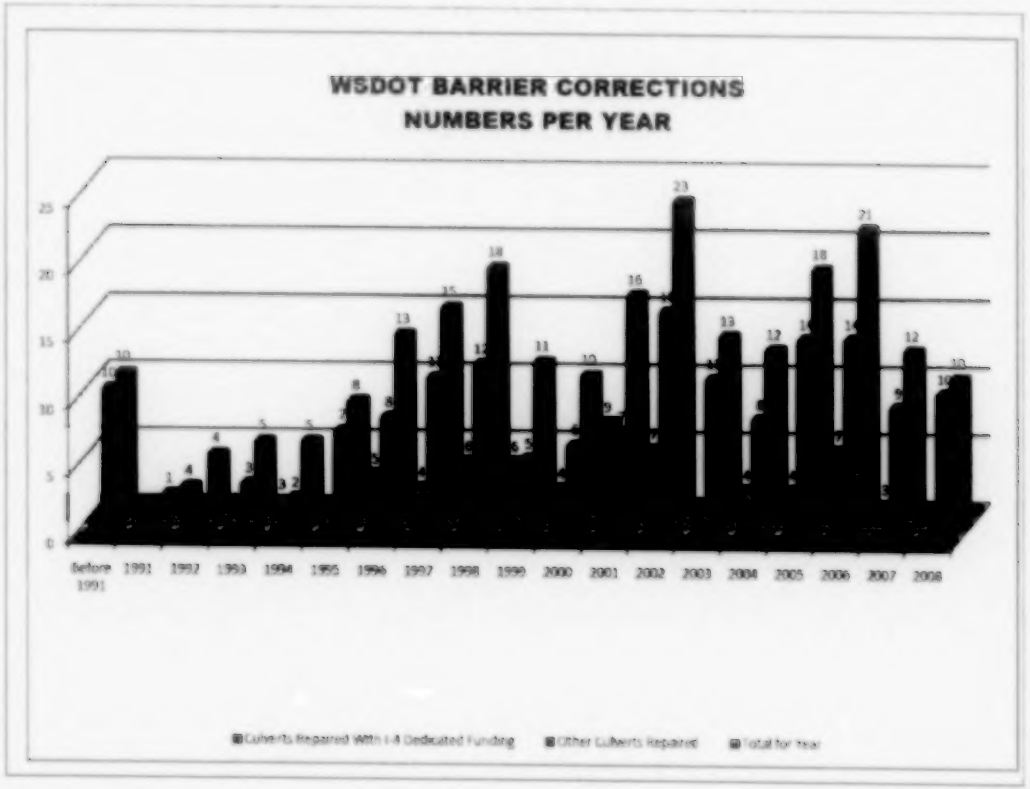
It is also important to anticipate potential natural lateral migration or vertical changes of the channel when sizing a culvert. The installation of a culvert fixes a section of the channel rigidly in place. If a stream is naturally unstable and/or is migrating across a floodplain, the rigidity of the culvert may exacerbate the stream's instability, accelerate the stream's migration rate or make the stream's migration become more pronounced and chaotic. Channels naturally move vertically over time. Instabilities may occur in which the channel bed upstream of the culvert aggrades (rises) and/or degrades (lowers) over long periods of time. A channel may also fluctuate in elevation in response to floods. Long-term or short-term channel changes must be accommodated in culvert design. If they can't be accommodated, other solutions, such as a bridge or an alternative road alignment, may be more appropriate.

Land-Use Planning

Many new stream crossings can be avoided (or at least the number required can be reduced) through proper land-use planning. Even the best of fish passage design has the potential to become a fish passage barrier. The way local jurisdictions prepare and implement land-use plans and critical-area ordinances has a direct influence on fish passage success by defining land uses and the transportation systems necessary to support them. For example, if a county fails to allocate forest or agricultural land, applying instead a very dense pattern of urban, suburban or rural residential land uses, one can expect many stream crossings to be required. This would not be the case if less dense and intense land uses, such as forestry or agriculture, were coupled with a combination of compact, urban growth areas and large, rural parcels.

In addition to the number of road crossings, changes in hydrology and riparian areas due to dense urbanization also affect fish passage. These changes cause channel incision and channel simplification that often leave culverts perched above the downstream channel, forming barriers to fish migration. Other cumulative impacts on sediment and temperature impacts. With these changes, the only adequate habitat left is confined to areas upstream of the urbanization, leaving downstream fish passage barriers even more damaging to fish production.

Fish passage is not the only habitat concern created by the improper design of fish culverts. These concerns are described in detail in Chapter 1.


WSDOT BARRIER CORRECTIONS
NUMBERS PER YEAR
25
20
15
10
5
0
Before 1991
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Culverts Repaired With I-4 Dedicated Funding
Other Culverts Repaired
Total for Year

Road	MP	Salr Id	Stream	Trib To	Priority Index (PI)	Habitat Gain (meters)
SR 5	256.15	991006	Squalicum Cr	Bellingham Bay	58.2	34,827
SR 8	6.3	990133	Wildcat Cr		52.7	21,924
US 2	23.07	07 0939 0 40	Wiggins Cr	Skykomish R	50.82	15,105
SR 3	40.95	15 02291 010	Chico Cr	Dyes Inlet	48	35,048
SR 202	0.1	102 L002	Little Bear Cr	Sammamish R	42.1	29,019
SR 16	28.1	990017	Anderson Cr	Sinclair Inlet	38.6	9,295
SR 16	28.1	998753	Anderson Cr	Sinclair Inlet	32.33	9,295
SR 96	0.47	102 N103	North Cr	Sammamish R	32.09	3,970
SR 101	267.16	990219	Johnson Cr		31.46	7,252
SR 548	4.7	990479	Terrell Cr	Birch Bay	31.43	11,313
SR 305	2.44	994325	Unnamed	Murden Cove	29.44	2,356
SR 307	0.49	991123	Dogfish Cr	Liberty Bay	27.97	7,891
SR 503	15.84	991656	Rock Creek		27.46	13,644
SR 6	5.37	990805	Unnamed	Willapa River	25.91	3,511
SR 101	102.14	990032	Unnamed	SB Big Cr	25.82	7,870
SR 101	149.06	990178	Hadlow Cr	Queets River	25.68	5,525
SR 162	11.04	105 R021121a	Carol Cr	Carbon R	23.48	2,906
SR 11	20.25	994389	Padilcos Cr	Bellingham Bay	22.72	4,213
SR 112	57.61	990002	Colville Cr		22.03	15,710
SR 99	54.24	102 N192	North Cr	Sammamish R	21.31	518
SR 307	1.34	991909	Unnamed	Dogfish Cr	20.92	3,372
SR 101	61.15	990053	Butte Cr	Smith Cr	20.69	2,880
SR 8	9.1	990773	Unnamed	Mox Chehalis	20.63	2,481
SR 5	58.63	990152	Foster Cr	Cowlitz River	20.56	6,939
SR 112	47.1	990304	Nelson Cr		20.42	4,694
SR 112	25.6	991730	Unnamed	Pryst	20.31	3,347
SR 101	303.01	994494	Marple Cr	Hood Canal	20.05	2,756
SR 12	9.04	994791	Unnamed	Wynoochee R	19.5	2,649
SR 101	90.73	990076	Unnamed	Hoquiam R	19.5	323
SR 112	33.21	990214	Joe Cr		19.37	7,158
SR 503	13.25	991657	Unnamed	Rock Cr	18.88	3,325
SR 101	100.9	990726	Unnamed	SB Big Cr	17.97	1,232
SR 542	38.98	990006	Chesnuy Cr	NF Nooksack R	17.41	306
SR 503	25.36	990073	Chelatchee Cr		16.8	2,032
SR 307	1.46	991572	Unnamed	Dogfish Cr	16.41	1,024
SR 12	95.75	990180	Highland Cr	Tilton River	16.12	5,980
SR 112	29.12	991722	Indian Cr		15.98	2,567
SR 530	42.9	990151	Forbson Cr	NF Stillaguamish R	15.37	1,030
SR 503	33.04	994531	Brooks Cr		15.28	2,072
SR 7	5.5	990831	Unnamed	Tilton River	15.13	794
SR 109	33.1	991272	Wayne	Pacific Ocean	14.45	3,972
SR 19	4.3	990711	Seersonville Cr	EF Chemacum Cr	14.11	3,178
SR 101	209.32	990564	Wiesn Cr		13.7	3,273
SR 9	67.33	991448	NP Cr	Samish R	12.68	2,101
SR 109	36.43	991270	Unnamed	Pacific Ocean	12.18	3,081
SR 112	52.9	991660	Northstrom Cr		11.46	4,855
SR 7	41.17	990297	Mack Creek		24.61	8,348
TOTAL						

WRIA	Proposed Solution	Estimated Cost	Region
1	Replace with 25' stream simulation culvert	$8,341,858	NW
22	Retrofit of existing 20'Wx8'H box culvert	$268,100	Oly
7	Remove flume structure under bridge & reconstruct stream channel	$750,000	NW
15	Replace culverts with 4 bridges	$26,700,000	Oly
8	130' long x 42' wide by 12' tall culvert	$4,967,075	NW
15	20' wide stream simulation design (two pipes that will become one)	$8,443,544	Oly
15	see above	see above	Oly
8	Replace culvert with 11' culvert	$1,492,000	NW
19	Repair downstream rock weir w/ roughened channel	$173,000	Oly
1	Replace 8' round culvert with 24' wide stream simulation culvert	$3,837,028	NW
15	Replace 5'x4' culvert with 14' wide no slope	$2,948,000	Oly
15	Replace 4' culvert with 15'x10' no slope culvert	$2,231,700	Oly
27	24'Wx12'hx110'L no slope design	$1,338,348	SW
24	14'W stream simulation design	$950,000	SW
22	Replace with a stream simulation design	$1,230,000	Oly
21	Replace box culvert with a bridge	$5,103,118	Oly
10	Replace 3'x2' culvert with	$1,500,000	Oly
1	Convert 2,310' pipe to storm sewer and build new creek channel	$6,500,000	NW
19	Replace two 4' culverts with a 24' stream sim culvert	$2,621,354	Oly
8	Replace 2.5' pipe with a 12' stream sim culvert	$2,314,000	NW
15	Replace 4' culvert with 15'x10' stream sim design	$2,440,228	Oly
24	14'W stream simulation design	$600,495	SW
22	Retrofit of existing 4'Wx4'H box culvert	$143,100	Oly
26	Retrofit of existing 9'x9' box with 6 downstream grade controls	$363,808	SW
19	15' wide stream simulation	$1,338,400	Oly
19	12' wide stream simulation	$836,709	Oly
17	140' bridge	$4,467,000	Oly
22	12' diameter round no slope culvert	$1,048,000	Oly
22	8' round stream simulation	$974,300	Oly
19	20' wide stream simulation	$1,855,000	Oly
27	20'Wx20'hx110'L stream simulation	$1,674,000	SW
22	10' wide stream simulation	$931,044	Oly
1	30' span bridge	$866,654	NW
27	12'Wx8'H no slope design	$656,508	SW
15	Replace with 13' stream simulation culvert	$2,726,000	Oly
25	16' W x 90' L stream simulation design	$748,328	SW
19	Replace 2' culvert with 12' stream sim and removes hairpin curve	$2,843,225	Oly
5	15'W x 12'H stream simulation culvert w/ grade controls	$2,528,424	NW
27	22'Wx120'L stream simulation design	$1,366,464	SW
26	40' W x 116' L bridge	$2,424,723	SW
21	Replace culvert with 200' bridge	$4,992,000	Oly
17	Replace 2' culvert with 10' stream sim design	$1,215,169	Oly
19	Replace 5' culvert with 17' stream sim design	$1,670,885	Oly
3	Replacement with a 12' stream simulation box	$1,104,502	NW
21	Replace fishway with 60' to 80' bridge	$2,300,250	Oly
19	Replace 5' culvert with 18' stream sim design	$2,382,467	Oly
11	Replace double box culvert with 22' wide stream simulation culvert	$1,729,600	Oly
		$127,967,487	

THE HONORABLE RICARDO S. MARTINEZ

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

UNITED STATES OF AMERICA, et al., Plaintiff, vs STATE OF WASHINGTON, et al., Defendant.	No. C70-9213 Subproceeding 01-1 DECLARATION OF LAWRENCE JAY WASSERMAN

I, LAWRENCE WASSERMAN, declare as follows:

1. I am over the age of eighteen and am competent to testify on the matters set forth herein. I make this declaration and the report attached hereto on the basis of my personal knowledge, skill, experience, training and education.

2. I received a Bachelor of Arts degree in Biology from the State University of New York at Buffalo in 1976 and a Master of Science Degree in Fisheries from the University of Washington in 1984. My thesis for my master's degree is entitled "The Rearing Potential for Coho Salmon (Oncorhynchus kisutch) in Streams Affected by the Eruption of Mount St. Helens."

3. I have authored or co-authored the following scientific papers:

Cause No. C70-9213, Sub. 01-1
Plaintiffs' Exhibit AT-010

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OFFICE OF TRIBAL ATTORNEY
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LA CONNER, WA 98257
PH: (360) 466-3163, FAX: (360) 466-5289

a. Wasserman, Lawrence Jay. 1984. "The Rearing Potential for Coho Salmon (Oncorhynchus kisutch) in Streams Affected by the Eruption of Mount St. Helens. M.S. Thesis. Univ. of Washington." 108 pp.;

b. Wasserman, Lawrence J., Carl J. Cederholm, and Ernest O. Salo. 1984. "The Impact of Logging on Benthic Community Structure in Selected Watersheds of the Olympic Peninsula, Washington." Univ. of Washington. Tech. Rep. FRI-UW-8403;

c. Wasserman, Larry, Joel Hubble, Bruce Watson, Yakama Indian Nation, Fisheries Resource Management, Tom Vogel, Project Manager, U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Contract No. DE-AI79-1983BP39461, Project No. 1982-16, 131 electronic pages (BPA Report DOE/BP-39461-1)

d. Hilby, R.E. and L. Wasserman. 1989. "Forest practices and riparian management in Washington State: data based regulation development." in Practical Approaches to Riparian Resource Management: an Educational Workshop, May 8-11, 1989, R.E. Gresswell, B.A. Barton and J. L. Kershner, editors. U.S. Bureau of Land Management, Billings, Mont., pp. 87-94;

e. Martin, D.J., L.J. Wasserman, and V. Dale. 1986. "Influence of Riparian Vegetation on Post-eruption Survival of Coho Salmon Fingerlings on the West-Side Streams of Mount St. Helens, Washington." North Amer. J. Fish. Mgmt. 6:1-8;

f. Martin, Douglas J., Lawrence Wasserman, Robert P. Jones, and Ernest O. Salo. 1984. "Effects of Mount St. Helens' Eruption on Salmon Populations and Habitat in the Toutle River." Office of Water Research and Technology., Washington Water Research Center. Tech. Comp. Rep. 130 pages;

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g. Beechie, T., Beamer E. and Wasserman, L. 1994. "Estimating Coho Rearing Habitat and Smolt Production Losses to develop a Restoration Strategy for a Large River Basin," N. Amer. J. Fish. Mgmt. 14:797-811;

h. Hollowed, John J. and Wasserman, L. 1999. "A Critique of the State's Hydraulic Code, RCW 75.20," Center for Natural Resource Policy Report, and

i. Hollowed, John J. and Wasserman, L. 2001. "A Critique of the Washington States' Instream Resource Protection Laws and Regulations," Center for Natural Resource Policy Report.

4. The aforementioned paper entitled by "Estimating Coho Rearing Habitat and Smolt Production Losses to develop a Restoration Strategy for a Large River Basin" authored by myself and two of my colleagues at the Skagit System Cooperative was awarded a citation by the American Fisheries Society for the Most Significant Paper in the North American Journal of Fisheries Management for 1994.

5. Between 1983-1986 I was employed as Environmental Services Director by the Yakama Nation as a researcher and project manager. Among my duties, I investigated the potential for restoring Chinook salmon populations through the use of hatchery supplementation. I also investigated the movement of juvenile Spring Chinook throughout the Yakima River. I was involved with the design and operation of a large smolt trap on the Yakima River.

From 1986 to 1991, I continued in my role as Environmental Services Director, but my duties changed. In this period of time, I oversaw environmental protection of fisheries resources for the Yakama Nation. My area of responsibility included the Columbia River Watershed and its tributaries above Bonneville Dam within Washington State. My

responsibilities included, but were not limited to: (a) reviewing and commenting on forest practices applications, water rights applications, permits for on and off reservation timber sales; (b) reviewing and commenting on local, State and Federal legislation; (c) reviewing, commenting and negotiating, where necessary, hydraulic project approvals, and general land use permits issued by municipal, County, State and Federal agencies. In this capacity, I was responsible for providing technical recommendations to the Yakama Tribal Council regarding the impact such activities might have on fisheries resources and what action the Yakama Nation could take to protect such resources. Additionally, I was tasked with locating blocking culverts on the Yakama Indian Reservation.

During this time I was involved as a negotiator in the Timber, Fish and Wildlife Agreement, which was a negotiated agreement between the State of Washington, the Washington Forest Practices Association, Washington Farm Forestry Association, , Washington State Indian Tribes, and several environmental organizations. This agreement resulted in increased protection for fisheries resources affected by Washington State's Forest Practices rules. I was also involved in the establishment of the Hanford Reach National Monument on the Columbia River, which provided permanent protection for the last free flowing section of the Columbia River.

6. From 1991 until 2007 I was employed as Environmental Services Director by the Skagit System Cooperative ("SSC"), which represented the fisheries interests of the Sauk-Suiattle Indian Tribe, the Upper Skagit Indian Tribe and the Swinomish Indian Tribal Community. SSC changed its name to the Skagit River System Cooperative ("SRSC") in 2004 when the Upper Skagit Indian Tribe withdrew from the consortium. My work for both SSC and SRSC entailed

advocating for the protection of natural resources and specifically for the protection and restoration of fisheries throughout the Tribes' usual and accustomed fishing areas. However, the area of greatest emphasis was the Skagit River watershed, which is the third largest river in the western United States and contains wild populations of all six species of Pacific salmon. A portion of my work was dedicated to reviewing the scientific literature and analyzing Skagit Basin specific field data addressing the impacts of land use practices on salmon habitat and the use of that data in developing strategies for the protection of Tribal resources. I have been involved with drafting regulations regarding watershed analysis pursuant to the Washington State Forest Practices Act, and have served as a member of tribal negotiating teams involved in State-wide negotiations associated with instream flows, forest practices, and agricultural practices. Much of my work has been focused on developing mechanisms to protect Tribal natural resources. These fora have included discussions and negotiations with elected leaders at the local, State and Federal levels, with local and statewide business, recreational, and environmental interests, and with other Tribes and Tribal organizations. This work includes the development of management strategies to protect and restore Tribal resources through collaborative as well as legal means.

7. In 2007 I began employment at the Swinomish Indian Tribal Community as Environmental Policy Manager. My duties and responsibilities are the same as those previously provided to the Sauk-Suiattle Indian and Swinomish Tribes while I was employed by Skagit River System Cooperative as Environmental Services Director.

8. Over the last twenty-five years, I have kept current on the literature associated with the Pacific salmon life histories and habitat management. In addition to the work identified above, I

have undertaken scientific analyses regarding riparian vegetation management and the setting of instream flow levels for salmon by the State of Washington.

9. For at least twenty years, I have been a member of the American Fisheries Society and am past Secretary-Treasurer of the North Pacific International Chapter of the American Fisheries Society and served for 2 years. I was formerly a member of the North American Benthological Society.

10. I am currently Vice-President of a non-profit organization called the Center for Natural Resource Policy, which provides Native American tribes and members of the public with policy, legal, and scientific support on fisheries and other natural resource issues.

11. From 1997-2008 I was Vice-Chair of the Skagit Watershed Council, a watershed based non-profit organization made up of multiple stakeholders. The mission of the Council is to promote voluntary salmon restoration projects within the Skagit River watershed. We developed a restoration strategy for the recovery of salmon in the Skagit River as well as criteria by which the Watershed Council would evaluate restoration projects for submittal to funding agencies.

12. Attached hereto and incorporated by reference is a true and complete copy of a report that I prepared at the request of counsel for the Plaintiff-Intervenor Tribes in this case. The report describes basic life history strategies and requirements of salmon and steelhead that occur within the *United States v. Washington* Case area.[1] It contains four parts: first, I describe in

[1] I use the term "case area" as it was defined by Judge Boldt in *United States v. Washington*, 384 F.Supp. 312, 327 (W.D. WA. 1974), namely, "that portion of the State of Washington west of the Cascade Mountains and north of the Columbia River drainage area, and includes the American portion of the Puget Sound watershed, the watersheds of the Olympic Peninsula north of the Grays Harbor watershed, and the offshore waters adjacent to those areas."

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general terms life history characteristics and essential habitat components common to all salmon. Second, I discuss species specific life history strategies and factors influencing salmon survival. Third, I describe the impacts of culverts that impede fish passage and/or result in adverse environmental impacts to salmon habitat and why repairing culverts make sense financially, socially, and biologically. Fourth and finally, I describe Tribal efforts to protect and restore salmon populations, including efforts to repair culverts. For the purposes of this declaration and report, Pacific salmon and steelhead will be referred to as salmon throughout the document unless otherwise noted.

13. In preparing my report, I have generally relied upon the Joint Statement Regarding the Biology, Status, Management and Harvest of the Salmon and Steelhead Resources of the Puget Sound and Olympic Peninsular Drainage areas of Western Washington (hereinafter Joint Biological Statement) prepared in 1973 for use by the Washington Department of Fisheries, Washington Department of Game, and the U.S. Fish and Wildlife Service for this case and was admitted into evidence as JX-2a[2] as well as a more current and extensive treatise on Pacific salmon by Groot, C., and L. Margolis entitled Pacific Salmon Life Histories (University of British Columbia Press, Vancouver, British Columbia, 1991). The latter treatise is recognized as a reliable authority by experts in the field of fisheries for the propositions set forth in my report.

14. Figure 5.1 is a true and correct copy from Beamer, et al. (1998). This figure demonstrates graphically the relationship between density of salmon and salmon production:

2 *United States v. Washington*, 384 F.Supp. at 328.

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I am familiar with this relationship and the Beaverton-Holt stock recruitment curves. I can attest that the graph in Figure 5.1 accurately demonstrates this relationship in the Skagit watershed. The data shown in this figure are considered reliable by scientists in my field of expertise.

15. Figure 4.1 is a true and correct copy from the Skagit Chinook Recovery Plan, Appendix D prepared by the Skagit River System Cooperative and Washington Department of Fish and Wildlife (WDFW) in 2005. This figure demonstrates graphically the concept of density dependence and density dependence mortality in the Skagit watershed. I am familiar with both of these two concepts in a general manner and as they pertain to the Skagit watershed. I can attest that the graphs in Figure 4.1 accurately demonstrate these two concepts in the Skagit watershed. The data shown in this figure are considered reliable by scientists in my field of expertise.

16. Attachment A is a true and correct copy of an illustration entitled Pacific Salmon lifecycle prepared by the Washington Department of Fish and Wildlife. It illustrates the general life history strategies of anadromous salmonids. As a fisheries biologist, I am familiar with these life history strategies, and can attest that the picture in Figure 1 accurately explains those strategies for Pacific salmon. The data shown in this figure are considered reliable by scientists in my field of expertise.

17. Attachment B is a true and correct copy of pages 17-20 of the Joint Statement Regarding the Biology, Status, Management and Harvest of the Salmon and Steelhead Resources of the Puget Sound and Olympic Peninsular Drainage areas of Western Washington prepared in 1973.

for use by the Washington Department of Fisheries, Washington Department of Game, and the U.S. Fish and Wildlife Service for this case and admitted into evidence as JX-2a.

18. Attachment C is a true and correct copy of pages 7-13 from the Washington Department of Fish and Wildlife's Manual entitled *Design of Road Culverts for Fish Passage* (2003). These pages discuss impacts associated with culverts. As a fisheries biologist, I am familiar with biological life histories of salmon and how those life histories are impacted by fish passage barriers, specifically culverts. These pages from WDFW's Manual accurately explain those impacts and would be considered to reliably depict those impacts by scientists in my field of expertise.

19. Attachment D is a true and correct copy of a photograph that I took on a digital Pentax Optio W20 camera on 9/1/2006 (8/30/2006). It shows a culvert on an unnamed tributary to the Nooksack River (Site No.T39R05E-27) that will not allow for upstream passage of either adult or juvenile salmon because the distance between the water surface elevation and the bottom of the culvert is too great for the fish to ascend. The photograph accurately portrays the scene which I personally witnessed.

20. Attachment E is a true and correct copy of a photograph that I took on a digital Pentax Optio W20 camera on 9/1/2006. It shows elimination of rearing habitat within a culvert adjacent to Site No.T39R-05-27 on DNR S1100. The photograph accurately portrays the scene which I personally witnessed.

21. Attachment F is a true and correct copy of a photograph that I took on a digital Pentax Optio W20 camera on 9/01/2006. It shows an unnamed tributary to the Nooksack River, shows a

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culvert with adequate substrate within the culvert Site No. T39R06E-119. The photograph accurately portrays the scene which I personally witnessed.

22. Attachment G is a true and correct copy of a photograph taken by Kurt Buchanan, a fisheries biologist at the Washington Department of Fish and Wildlife on 12/9/2004. It shows the culvert at Red Cabin Creek (Site No.AR11) in December 2004 in the Skagit Basin under State Route 20 filled with sediment prior to dredging by the Washington Department of Transportation (with his handwritten notes excised). The photograph was provided to the Skagit River System Cooperative by Mr. Buchanan as part of our work on culverts and Red Cabin Creek in particular. I routinely receive and rely on photographs of this type in performing my professional duties as a fisheries biologist. The photograph accurately portrays scenes which I have personally witnessed at Red Cabin Creek in 2006, 2008 and 2009.

23. Attachment H is a true and correct copy of a photograph that I took on a HTC TouchPro Cellphone camera on February 20, 2009. It shows the same culvert at Red Cabin Creek (Site No.AR11) filled with sediment. The photograph accurately portrays the scene which I personally witnessed.

24. Attachment I is a true and correct copy of a photograph that I took on a HTC TouchPro Cellphone camera on February 20, 2009. It shows the blockage at the downstream end of the same culvert (Site No.AR11) in Red Cabin Creek. The photograph accurately portrays the scene which I personally witnessed.

25. Attachment K is a true and correct copy of a photograph that I took on a digital Pentax Optio W20 camera on 8/30/2006. It shows the culvert at Red Cabin Creek (Site No. AR11)

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after the streambed had been dredged. The photograph accurately portrays the scene which I personally witnessed.

26. Attachments K and L are true and correct copies of two photographs that Keith Wyman, a former employee at Skagit River System Cooperative, took on 12/2/2002 and 12/9/2004 respectively. Attachment J shows a number of dead unspawned coho salmon stranded as a result of Washington State Department of Transportation (WSDOT) dredging activities at the same culvert (Site No.AR11) on Red Cabin Creek. Attachment K shows numerous adult and juvenile salmon that have been stranded (and subsequently died) as a result of the WSDOT maintenance activities at the same culvert (Site No.AR11) on Red Cabin Creek. Both photographs were taken by Mr. Wyman while employed at the Cooperative and provided to me as part of my daily work at the Cooperative. I routinely receive and rely on photographs of this type in performing my professional duties as a fisheries biologist. Both photographs were also provided to Kurt Buchanan of WDFW and appear in the Email referenced as Attachment M below.

27. Attachment M is a true and correct copy of an Email from Kurt Buchanan of WDFW to Greg Hueckel and Pat Chapman, with copies to Bob Bicknell, Craig Olds, Gayle Kretsman, Rich Costello, and Rich Johnson dated 12/6/2004 with his attached notes of his observations of the sediment blockage of the culvert at Red Cabin Creek (Site No. AR11). The Email and notes with photographs were provided to the Skagit River System Cooperative as part of my and the Cooperative's work on culverts and Red Cabin Creek in particular. I routinely receive and rely on Emails and reports of this type in performing my professional duties as a fisheries biologist.

28. Attachment N is a true and correct copy of a Hydraulic Project Approval (HPA) dated August 19, 2002 (Log # ST-F0760-03) issued by WDFW to WSDOT for maintenance at Red Cabin Creek (Site No. AR11). The HPA was provided to Skagit River System Cooperative by Kurt Buchanan of WDFW as part of my and the Cooperative's work on culverts and Red Cabin Creek in particular. I routinely receive and rely on HPAs in performing my professional duties as a fisheries biologist. The HPA is also a matter of public record.

29. Attachment O is a true and correct copy of a photograph that I took on a digital Pentax Optio W20 camera on 12/07/2006. It shows a culvert (Site No. 9900046) on Bruce Creek in the Nooksack Drainage filled with sediment. The photograph accurately portrays the scene which I personally witnessed.

30. Attachment P is a true and correct copy of a photograph that I took on a digital Pentax Optio W20 camera on 9/1/2006. It shows a culvert (Site No. 9900046) on Bruce Creek in the Nooksack Drainage after sediment has been removed by dredging. The photograph accurately portrays the scene which I personally witnessed.

31. Attachment Q is a true and correct copy of a photograph that I took on a digital Pentax Optio W20 camera on 9/1/2006. It shows a beaver dam constructed on culvert (Site No. 01 03530) on Bear Creek in the Nooksack watershed filled with sediment. The photograph accurately portrays the scene which I personally witnessed.

I declare under penalty of perjury that the foregoing is true and correct.

EXECUTED on this 30th day of March, 2009 on the Swinomish Indian Reservation near the

town of LaConner, Washington.

LAWRENCE JAY WASSERMAN
Environmental Services Manager
Swinomish Indian Tribal Community

United States v. Washington
United States District Court
Western District of Washington
Case No. C70-9213, Subproceeding 01-1

Written Direct Testimony Of Lawrence Jay Wasserman
Environmental Policy Manager
Swinomish Indian Tribal Community

Witness For Plaintiff-Intervenor Tribes

Testimony Prepared March 27, 2009

A. Salmon need unobstructed passage to their spawning and rearing areas.

Each species and population of salmon has preferred geographic areas and gravel characteristics that they seek out prior to spawning. Since salmon do not feed in fresh water, each species and population must reach its preferred spawning area in a timely fashion so that its limited energy reserves are not depleted prior to spawning. Suitable spawning gravels are not evenly distributed throughout river and tributary systems, and natal streams may be located considerable distances from the mouth of river systems. Spawning salmon therefore need access to reach site specific spawning grounds in order to successfully spawn and produce offspring which will form the basis of the next cycle of returning adults.

Juvenile salmon also move considerable distance both upstream and downstream for a number of reasons. Their life history requirements are such that they need to find the appropriate depths, velocities and substrates in which to thrive in order to maximize food intake and minimize the expenditure of energy while swimming. Too many fish in one area may overwhelm the available food supply resulting in reduced growth rates of juvenile fish. The ability to migrate throughout streams provides individuals an opportunity to find lower density areas where food supplies may be more plentiful. Survival of juvenile fish is greatly influenced by body size, which in turn is related to the balance between energy expenditures and availability of food supply.

Juvenile salmon need to find refuge areas to avoid predation, and to escape from high velocity streamflows during flooding or high temperatures that can be life threatening.

Adequate access to all parts of a watershed is necessary for dispersal of juvenile salmon populations. Salmon fry redistribute themselves to low velocity areas, such as side channels and slough areas after emergence. This redistribution is important so that young fish can colonize all accessible parts of the watershed, thereby reducing density dependent mortality. Both juvenile steelhead and coho salmon swim downstream from their natal streams during the summer months, and then upstream either in their home tributary or in other tributaries with the onset of fall rains. (Cederholm and Scarlett, 1981). Unimpeded passage provides the opportunity for juvenile salmon to access these important areas.

Finally, salmon need unimpeded access to the sea as smolts. Juvenile salmon generally move as smolts to the sea in late winter or spring, when stream flows are conducive to rapid downstream migration. If downstream passage is impeded so that fish cannot access the sea, the critical component of ocean residency is lost, with a resultant loss of production of fish from within the watershed.

B. Salmon require an adequate supply of cool water.

Access to stream segments with appropriate water temperatures is an important component of ensuring that life history requirements at each life state are met. Salmon extract oxygen from water and the amount of oxygen in the water is dependant on a variety of factors including temperature. Lower streamflows in summertime coupled

E. Chum Salmon

Chum salmon generally return to Washington streams from September through December after spending two (2) to five (5) years at sea. Peak spawning occurs in late November through December, with reports of spawning occurring as late as March in the Nisqually River. (Joint Biological Statement, p. 6). Spawning areas occur near tidewater in the coastal streams of the Olympic Peninsula, while in Puget Sound, spawning tends to occur in the lower gradient portions of rivers and streams, and in backwaters, side channels and ponds with areas of upwelling. Chum salmon fry begin to move downstream soon after emergence, but in contrast to pink salmon, they spend a few days to weeks in estuarine areas prior to entering marine waters.

F. Steelhead

Steelhead tend to spend two (2) to four (4) years at sea before returning to spawn. There are two broadly defined runs of steelhead in Puget Sound: winter run and summer run. Summer run steelhead tend to enter rivers from June through October, while winter run steelhead enter from November through May. Peak spawning occurs in April and May. Steelhead spawn in large rivers and in both small and large tributaries. Juvenile steelhead are found throughout the upper reaches of small tributaries as far upstream as is accessible. They spend one to two years in freshwater prior to seaward migration. As with coho and spring chinook, juvenile steelhead require an adequate supply of high quality habitat during their extended freshwater residence time.

IV. FRESHWATER FACTORS INFLUENCING SURVIVAL AND MORTALITY OF SALMON

A. Overview of Density-Dependent Mortality

The number of adult fish produced within a watershed is a product of the quality and quantity of available habitat coupled with the number of eggs produced by the adults that return to spawn. The number of fish available to be harvested or to spawn depends upon several factors: (1) how many of the eggs deposited in the gravel survive; (2) how many fish that emerge from the gravel to migrate to sea; (3) how many adult fish survive in the ocean; and (4) how many adults make it back to their spawning grounds. These factors are affected by annual variations in environmental conditions and the quantity and quality of accessible habitat to support incubating eggs, rearing juvenile salmonids, as well as by marine conditions and harvest rates.

Beamer *et al.* (1998) provide a description of the relationship between density of salmon and salmon production.

> The processes regulating recruitment at small stock sizes are thought to be density-independent, whereas the processes regulating recruitment at large stock sizes are thought to be density-dependent. The relationship over a range of stock sizes is illustrated as some form of curve, such as the dome-shaped Ricker relationship or the asymptotic Beverton-Holt relationship. The asymptotic Beverton-Holt relationship is often used to characterize

salmonids with extended freshwater life histories, such as coho and steelhead (Lestelle et al. 1993b). The equation

$$R = \frac{S}{bS + a}$$

is used to describe this relationship, where R is the number of smolts and S is the number of female spawners. Density-independent survival ($1/a$) is smolts per female spawner at the theoretical "zero" spawner density, and smolt carrying capacity is $1/b$. The coefficients a and b, which describe the shape of the Beverton-Holt curve, may be interpreted (at least in part) as being related to habitat characteristics (Mountain and Hilborn 1986). The parameter a is perhaps most closely related to habitat *quality*, while the parameter b is more closely related to habitat *quantity* (Lestelle et al. 1993b).

When habitat quality or quantity increase, $1/a$ or $1/b$ increase respectively. When "new" habitat area is made available to a fish stock by building a fish passage project (i.e., $1/b$ is increased), we expect to see a locally larger parent stock, and subsequently greater recruitment. Curves A and B in Figure 5-1 illustrate two cases where the habitat capacities are different, but density independent survival is the same. Curve A represents the stock-recruitment curve for a hypothetical coho stream with a carrying capacity ($1/b$) of 10,000 smolts and a density-independent survival rate ($1/a$) of 134 smolts per female spawner.[12] Curve B represents the same stream, except carrying capacity has been doubled by a fish passage project, allowing fish to utilize habitat upstream of the previous barrier. At a low spawner level (50 females), the stream can produce about 4,000 smolts before the fish passage project (curve A), but over 5,000 smolts after the project opens up new habitat (curve B). At a high spawner level (400 females[13]), the stream can produce about 5,400 smolts before the fish passage project (curve A) and over 14,500 smolts after completion of the project (curve B), a 73% increase. Curve C represents the same carrying capacity as B, but with poor quality habitat that reduces the stream's overall density independent survival by two thirds. At a spawner level of 50 females, stream C can produce only about 2,000 smolts after the project, compared to the original 4,000 smolts of curve A. Smolt production for curve C does not equal curve A until the level of 300 female spawners, and only shows a minor increase (~ 12%) at the level of 400 female spawners.

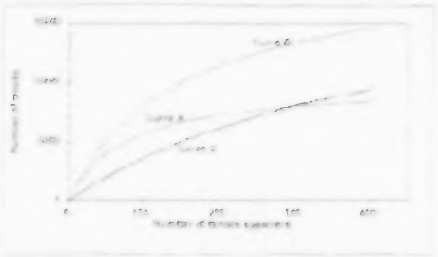


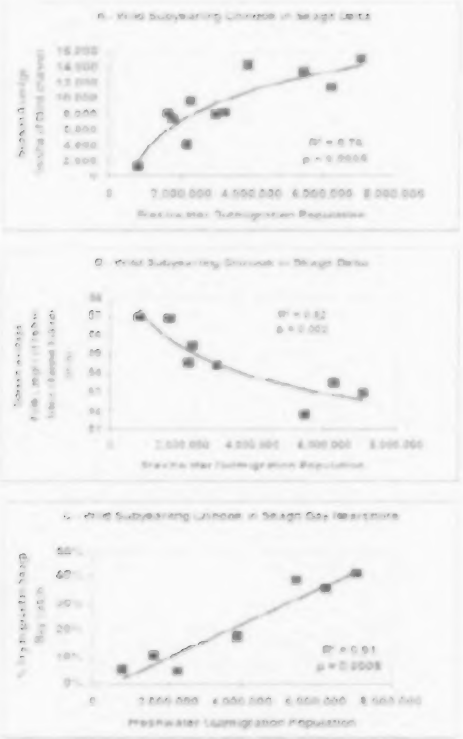
Figure 3-1. Results of Ricker's (1954) stock-recruitment analysis for a hypothetical coho salmon stock showing cases for (1) the maximum sustainable harvest at the carrying capacity (Case A), (2) the maximum sustainable harvest at a level of unfished equilibrium (Case B), and (3) the maximum sustainable harvest for the stock (Case C).

1. The rate (r) for female spawners to shed eggs, in months when the mean water temperature is 10 °C, from Beamish et al. (1999).
2) As in Lestelle et al. (1993b), we consider streams to be "fully seeded" when spawner levels are sufficient to produce ≥ 80% of smolt carrying capacity. In this case, 400 female spawners yield 1,000 smolts, or 80%, of carrying capacity.

(Beamish et al. 1999)

Figure 4-1 from the Skagit Chinook Recovery Plan 2005, Appendix D (Skagit River System Cooperative and Washington Department of Fish and Wildlife 2005), demonstrates graphically the concept of density dependence and density dependence mortality in the Skagit watershed. As density (measured as the number of fish per unit area) increases, one would expect that the number of smolts migrating to sea would increase proportionately. However, one can see in the Skagit estuary that once a certain density is reached, that relationship changes and the number of outmigrating fish (smolts) declines. The figure also shows that the smaller the average size of fish, the lower the number of outmigrating fish. These figures demonstrate that as the number of available spaces in the estuary fill up, with the result that there is increased competition for food and space, the survival (measured as number of outmigrants in this case) declines. In this instance, more habitat equates to more fish. To summarize, the number of fish available for harvest and spawning is, in large measure, dependent upon having access to sufficient freshwater habitat to maximize the number of smolts that migrate to the sea. These figures demonstrate that decreasing density by increasing the amount of habitat almost always increases watershed productivity.

Figure 4.1. Density dependence in the Skagit delta



(Skagit Chinook Recovery Plan, 2005)

There are a number of natural and anthropogenic causes for reduced survival of salmon in fresh and marine waters. Natural factors affecting populations include, but are not limited to, watershed productivity and available food supply, streamflows associated with precipitation, high temperatures, predation, and flooding, sedimentation, landslides, beaver activity, fires, windstorms and volcanos. These factors are all variable from year to year, and many can be influenced by human activities.

> One of the major problems facing salmon and trout populations is an inability to utilize their historic rearing and spawning grounds due to fish passage barriers that block access to upstream habitat.

Every species of salmon has been shown to be blocked by culverts, and blocking culverts have been found in every watershed within Puget Sound. A WSDOT literature review states:

> The conclusion of this literature review is that stream dwelling salmonids are often highly mobile. Upstream movement was observed in nearly all studies that were designed to detect it, and in all species, age classes, and seasons. There are variations in the movement patterns of fish populations both between and within river systems.

(Kahler and Quinn, 1998.)

It is generally acknowledged that removal of barrier culverts is a primary mechanism to restore Puget Sound salmon stocks. Fish blocking culverts are listed as a factor limiting salmon production in every watershed in Puget Sound. (Washington State Conservation Commission.) Culverts are also identified as a key factor necessary for recovery in almost every local watershed chapter of the Puget Sound Chinook Recovery Plan[1] as well as in the federal supplement to that plan. (National Marine Fisheries Service, 2006). While a recovery plan has yet to be adopted for the more recently listed steelhead,[2] similar life histories strategies between juvenile and adult coho and steelhead would indicate that similar benefits would accrue to steelhead as would be predicted for coho salmon.

Fish Passage has have also been listed as a critical component of the *Policy of the Washington Department of Fish and Wildlife and the Western Washington Treaty Tribes Concerning Wild Salmonids* adopted by the Washington Fish and Wildlife Commission (December 5, 1997) which has as its goal

> to protect, restore, and enhance the productivity, production, and diversity of wild salmonids and their ecosystems to sustain ceremonial, subsistence, commercial, and recreational fisheries, non-consumptive fish benefits, and other related cultural and ecological values.

Page 4. Policy statement 14 states:

> Provide, restore, and maintain safe and timely pathways to all useable wild salmonid habitat in fresh and marine waters, for salmonids at all life stages.

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[1] The Puget Sound Salmon Recovery Plan was approved by the National Marine Fisheries Service, National Oceanographic and Atmospheric Administration, Department of Commerce on January 19, 2007.

[2] Puget Sound Steelhead are listed as threatened under the federal Endangered Species Act. 71 Fed. Reg. 14666 (3-29-2006).

Ensure salmonids are protected from injury or mortality from diversion into artificial channels or conduits (irrigation ditches, turbines, etc.).

Ensure natural fish passage barriers are maintained where necessary, to maintain biodiversity among and within salmonid populations and other fish and wildlife.

Page 6. The document identifies the following performance measure for fish passage:

Provide and maintain free and unobstructed passage for all wild salmonids, according to state and federal screening and passage criteria and guidelines at all human-built structures.

The Washington Department of Fish and Wildlife describes how culverts affect salmon in its revised manual entitled *Design of Road Culverts for Fish Passage* (2003). The report identifies the following impacts associated with culverts:

1. Culverts result in the permanent, direct loss of instream and riparian habitat.
2. Installation and maintenance of water crossings that confine or constrict the channel or floodplain will break ecological connectivity, alter channel processes and change adjacent channel character and shape by affecting the movement of debris, sediment, channel migration, flood waters, and aquatic and terrestrial organisms.
3. Water crossings may create an entry point for road-runoff pollutants.
4. Fish passage can be hindered or blocked at water crossings.
5. Water crossings increase the risk of damage to the downstream habitat due to water crossing failure.
6. Cumulative impacts and risks of water crossings can be avoided or minimized by consolidating water crossings, employing full-span bridges, by simulating a natural channel through culverts, or removing water crossings. Access solutions that do not require water crossings are preferred.

(Excerpt attached hereto as Attachment C). Impacts resulting from the installation, operation and maintenance of culverts can be divided into two categories: spawning and rearing fish passage impacts, and habitat related impacts:

A. <u>Spawning and rearing fish passage related impacts:</u>

Barriers to upstream access to spawning and rearing areas result in a number of biological consequences to salmon populations. As stated above, returning salmon, upon entering freshwater, cease feeding and depend on stored fat reserves to meet the energetic requirements for reproductive product maturation and spawning. If, as a result of encountering a barrier culvert, adult salmon are delayed in reaching their spawning areas, or must exert a great deal of energy attempting to ascend a barrier culvert, energy reserves are depleted, and the adults may die without spawning. Partial barriers, which by definition are barriers that are impassable for adult salmon for only a portion of the year,

may have the same impact as complete barriers. The difference between partial and complete barriers is therefore merely one of what percentage of returning salmon may be affected by the barrier. In both instances prespawning mortality can occur. Those fish that cannot reach their spawning area and die unspawned do not contribute toward the total productivity of the watershed, and ultimately the number of smolts produced, and thereby adults, is reduced.

The following photograph is an example of a culvert on a tributary to the Nooksack River that will not allow for upstream passage of either adult or juvenile salmon because the distance between the water surface elevation and the bottom of the culvert is too great for the fish to ascend (enlarged version attached as Attachment D hereto)

Prespawning mortality can also occur where a culvert is a passage barrier due to either inadequate velocity or water depth, or where streambed erosion downstream from a culvert prevents access. If water velocities exceed the swimming speed capabilities of migrating salmon, they cannot ascend the culvert. Similarly, if the water depth in a culvert is too shallow, fish cannot ascend the culvert. Further, mortality can occur when adult salmon jump repeatedly when trying to ascend an inadequately constructed or operating culvert. In these instances fish may collide with the culvert creating impact injuries leading to mortality culverts.

Denial of access also results in increased spawner density downstream of impassable barriers, which may result in superimposition of redds, which can result in egg mortality. Further, if adult fish are precluded from reaching their spawning areas, then those fry that do emerge from the gravel will encounter an increased competition among emergent juvenile salmonids. As explained previously in Section IV, if juvenile densities are increased due to inadequate fish passage, the number of smolts produced will be reduced.

Barriers to upstream access reduce the spatial diversity of spawning areas for fish. This is important because having fish distributed throughout a watershed provides for a buffer from the impacts of a localized environmental damage. For example, if all the coho in a watershed were found in only one creek, and a landslide occurred in that creek, the population would be wiped out. If, on the other hand, coho were found in many creeks, the landslide would only affect a portion of the population. The watershed population as a whole could recover because there would be a continuing source of salmon to return from other parts of the stream system. This spatial diversity also provides for genetic diversity because it provides for local adaptation of discrete populations. As with the example of the landslide, fish populations with different genetic characteristics are able to withstand environmental change differently. A diversity of genetic characteristics adds to the overall robustness and survival of a population.

Adult passage barriers also reduce the productivity of streams. Salmon carcasses contribute significant beneficial nutrient sources to the watersheds in which they die. Both insects as well have fish have been demonstrated to use these carcasses as a food supply. Higher elevation streams are often more sterile than lower elevation streams, and these carcasses provide an important component of the stream ecosystem, which is eliminated if access is denied.

Barriers to juvenile and adult passage may eliminate salmon use in the best habitats within a watershed. In most watersheds, salmon habitat is more intact the further upstream one goes. Generally speaking, aside from logging activities, little human development has taken place in these higher elevation locations. These intact habitats provide a refugia for juvenile salmonids that may not be found in more environmentally compromised downstream reaches. The elimination of access to these habitats therefore has a disproportionately large impact on salmon populations because on a per unit area basis, the salmon habitat upstream might be much more productive than the habitat in lower elevation areas. One hundred (100) meters of habitat in a forested creek may produce significantly more salmon than in one hundred (100) meters of habitat in a downtown urban setting. Not only is habitat quantity compromised, but habitat quality may be as well. (Shaw and Steel, 2006).

Finally, with the onset of autumn rains, juvenile coho and steelhead move upstream into tributaries to seek refuge areas from winter storms. Movement into these refuge areas provide a critical element in the life history strategy of Pacific salmon. Passage barriers prevent this upstream movement, thereby subjecting juvenile fish to greater winter mortalities.

Along with my colleagues at the Skagit System Cooperative,[1] I conducted an analysis of the loss of coho salmon production within the Skagit River watershed. (Beechie, *et al.* 1994). This award-winning article[2] found that between 6% and 15% of the loss of coho production throughout the Skagit watershed was found to be due to blocking culverts. We calculated that blocking culverts was the second largest loss of coho production in the Skagit River watershed, led only by the loss of habitat due to diking, ditching, dredging and bank protection. When evaluating the loss of coho production in tributaries alone, however, we determined that 44% to 58% of the loss could be attributed to blocking culverts.

B. Habitat related impacts of culverts.

In addition to creating barriers to the upstream and downstream migration of anadromous fish, culverts also affect the habitat upon which these fish depend. Washington Department of Fish and Wildlife (2003) describes the impacts of culverts on salmon habitat (Attachment C hereto). The entire manual can be found on line at http://wdfw.wa.gov/hab/engineer/cm/. The following description summarizes the impacts of culverts on salmon habitat.

1. **Elimination of Spawning Habitat.** Culverts eliminate spawning habitat by replacing natural stream bottoms with metal or concrete pipes, by shortening streams due to channel realignment, by creating adverse velocities or by scour associated with higher than natural flows. Finally, additional sediments may be introduced into spawning areas as a result of culvert placement.

2. **Elimination of Rearing Habitat.** Culverts eliminate rearing habitat by replacing natural stream characteristics with those that are confined within a pipe. Habitat quality in the form of pools, riffles, and woody vegetation is rarely found within culverts. Riparian vegetation is often lost, and stream lengths may be shortened to accommodate installation. The latter occurs when meanders are cut off to accommodate road right of way. Undersized culverts increase stream velocity, thereby degrading habitat in both upstream and downstream directions. Habitat may be eliminated downstream by retarding the downstream movement of wood or by scouring habitat below the culvert when concentrated streamflows lead to higher velocities. Upstream habitat can be impacted when the stream bed upstream of the culvert erodes as a result of changing the natural stream gradient by placement of the culvert at a slope different from the original slope of the streambed.

The following photo shows the elimination of rearing habitat within a culvert (enlarged version attached as Attachment E hereto).

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[1] The Skagit System Cooperative is consortium which represented the fisheries interests of the Sauk-Suiattle Indian Tribe, the Upper Skagit Indian and the Swinomish Indian Tribal Community. When the Upper Skagit Tribe withdrew from the consortium in 2004, the name changed to Skagit River System Cooperative and the consortium continued to represent both the Sauk-Suiattle and Swinomish Tribes. Its staff of almost thirty scientists focus on fisheries management, restoration, and research issues affecting the Tribes' treaty right to fish in the Skagit River Basin and those marine waters within which the Tribes have usual and accustomed fishing grounds.

[2] As mentioned in my declaration, this article won a citation by the American Fisheries Society for the Most Significant Paper in the North American Journal of Fisheries Management for 1994.

In contrast to the above photograph, the next photograph which is of an unnamed tributary to the Nooksack River, shows a culvert with adequate substrate within the culvert (enlarged version attached as Attachment F hereto).

3. **Reduction of Food Supply.** Culverts reduce food production due to the loss of riparian vegetation within the culvert footprint as a source of terrestrial insect input, and as well as a result of diminished sunlight within the culvert which is an important component to aquatic insect production.

4. **Changes in Stream Velocities.** Undersized culverts create an upstream low velocity area during high flows which may result in unnaturally high rates of gravel accumulation. Lower water velocities cause gravels to be deposited rather than being exported downstream unimpeded. This deposition is quite unstable, and in addition to attracting fish to spawn within this unstable area, may direct streamflows towards the streambank rather than the main channel. These redirected flows have the potential to increase streambank erosion.

5. **Maintenance Impacts.** Undersized culverts frequently require maintenance that can have devastating impacts of salmon. Undersized culverts can fill with sediment following storms. Dredging is often required to open up the culvert and provide space within the culvert to allow water to freely flow. This dredging is not limited to the footprint of the culvert, but frequently extends for a considerable distance both upstream and downstream of the culvert.

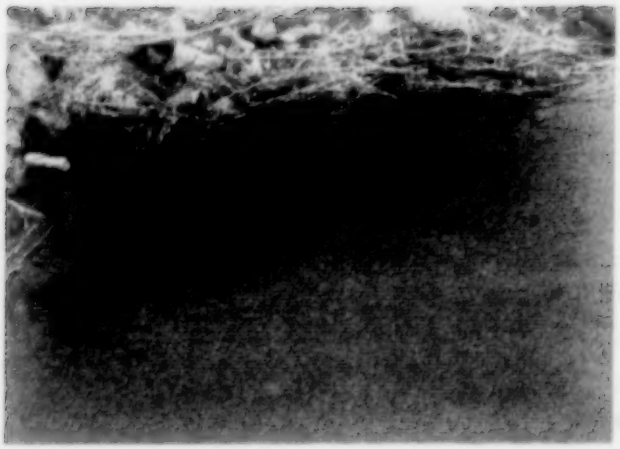
Channel migration, which refers to the lateral movement of water within the valley bottom of a stream, is a natural occurrence that is important to sustain salmon habitat. In addition to dredging to maintain adequate flow capacity within the culvert discussed above, streams frequently are dredged to ensure that stream channel migration does not result in the stream eroding the road prism rather than going through the culvert. These dredging operations destroy existing salmon habitat by removing in-channel woody debris and a natural pool riffle stream depth sequence, both of which are important for salmon rearing.

Red Cabin Creek provides an example of these problems, both from a fish passage standpoint and an ecosystem function standpoint. The following series of photographs show Red Cabin Creek following a storm event (enlarged versions attached as Attachments G-K hereto). The culvert is completely filled with sediment. When this occurs, as it does in some years, water and fish run over the road, and fish cannot easily pass downstream. These series of photographs show the following:

The photograph below (Attachment G hereto) shows the culvert filled with sediment in December 2004 prior to dredging.

The photograph below (Attachment H hereto) shows a similar occurrence in on February 20, 2009

The photograph below (Attachment I hereto) shows the blocked culvert at the downstream end of the culvert



The following photograph (Attachment J hereto) shows the culvert at Red Cabin Creek after the streambed has been dredged.

The following photograph (Attachment K hereto) shows a number of dead unspawned salmon stranded as a result of Washington State Department of Transportation dredging activities whereby fish were attracted to the excavated area and could not escape once flows diminished. (Personal Communication, Keith Wyman.)

The final photograph of Red Cabin Creek (Attachment L hereto) shows that on closer inspection, not only there a number of dead adult salmon, but numerous juvenile salmon that have been stranded (and subsequently died) as a result of the WSDOT maintenance activities. (Personal Communication, Keith Wyman.)

The undersized culvert in Red Cabin Creek has a number of impacts on fish. When sediment accumulates, salmon frequently spawn in the aggraded streambed. Subsequent dredging activity by WSDOT eliminates the salmon nests. The excavation by WSDOT is

undertaken to remove sediment to allow water to freely pass under the road. Unfortunately, the excavation creates a hole that fills with water and attracts both adult and juvenile salmon when stream flows dropped in the fall. These photographs show salmon which were attracted to the excavated area and could not escape once flows were further reduced in 2004. Had this culvert been properly sized, no excavation would have been necessary, and salmon would not have been attracted into the hole to later become stranded and die. The loss of these fish in this manner could have been avoided.

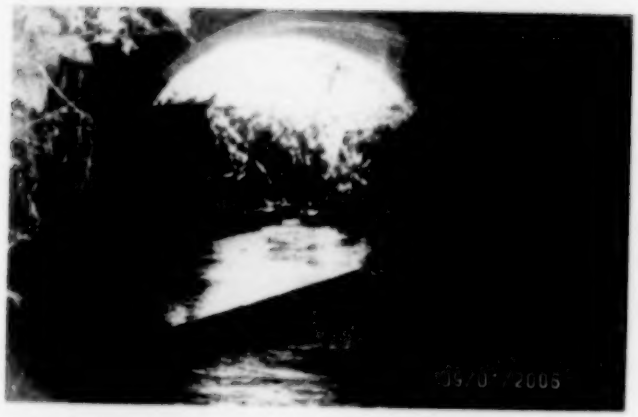
While these photographs show the impacts from maintenance dredging in 2004, it is not an isolated incident as WDFW biologist Kurt Buchanan recognized. Buchanan advised both his department and WSDOT of "the ongoing damages caused by the SR 20 culvert and dredging required to maintain it. . . . The documentation of fish damage is likely to increase, not decrease." Email from Kurt Buchanan to Greg Hueckel and Pat Chapman, with copies to Bob Bicknell, Craig Olds, Gayle Kretsman, Rich Costello and Rich Johnson dated 12/6/2004 (Attachment M hereto). Mr. Buchanan described the "negative impacts of long-term dredging" in an attachment to his Email, specifically reporting "emergency dredging is likely to occur in 04/04-05—the culvert and creek channel are nearly full again. Flagged redds are within the normal dredging area. The culvert and channel cannot be dug without destroying the redds already in place." As early as 2002, this culvert has been known to be a problem. As WDFW stated in the Hydraulic Project Approval issued for Red Cabin Creek maintenance activities by WSDOT: "Repeated maintenance dredging of this stream by the Washington Department of Transportation (WSDOT) constitutes an unacceptable adverse impact to fish life. The Department of Fish and Wildlife (WDFW) views replacement of this crossing, with the appropriate sized bridge or other approved structure, as the preferred alternative to dredging." Hydraulic Project Approval dated August 19, 2002 (Log # 97-F0760-03) issued (Attachment N hereto). Despite knowing about the adverse impacts to salmon as a result of an improperly sized culvert for at least 7 years, at the time of this report the original culvert is still in place and maintenance dredging with the ensuing impacts has continued.

The following two photographs of Bruce Creek, a tributary to the Nooksack River, demonstrate a culvert blocked by sediment and the loss of riparian and instream habitat after dredging had occurred to remove the sediment (enlarged versions attached as Attachments O and P respectively).

6 **The movement of wood, water and sediment is impeded.** Culverts may impede the movement of water, sediment and wood and each can have devastating effects on salmon habitat. If water, wood or sediment cannot adequately pass

through a culvert, the culvert may become plugged. If the culvert becomes plugged, the upstream hillslope may become saturated, and if that occurs, it may lead to a landslide or road failure. Alternatively, a plugged culvert may develop a debris torrent, which results from the impounded water and sediment associated with the plugged culvert overwhelming the culvert similar to a dam break. In either instance, the culvert becomes overwhelmed and there is a tremendous and rapid release of wood, water and sediment sent cascading downstream and depositing sediment, flooding the stream, and unleashing significant erosive forces. The effects on fish populations can be devastating. Both landslides and debris torrents can inundate salmon habitat for thousands of meters downstream of a blocked culvert. Undoing these effects and restoring the habitat can take many years and millions of dollars.

The following photograph of a beaver dam constructed on a culvert located on Bear Creek in the Nooksack watershed is an example of how culverts may become blocked (enlarged version attached hereto as Attachment Q hereto).



The recruitment of wood that can accrue from a long distance upstream of a culvert and be transported far downstream can be impeded by an inadequately sized culvert, and this loss of downstream wood can significantly reduce salmon production. The legacy of logging, agriculture, and development has resulted in severe reductions in mature streamside vegetation. Much of the most intact riparian vegetation is found in the upper portions of watersheds. If fish passage structures are not sized to accommodate the transportation of wood, in addition to increasing the possibility of landslides and debris torrents, they retard the movement of wood to downstream salmon habitats, which as I describe earlier in this report is so critical to salmon.

VI. REASONS REPLACING CULVERTS TO PROVIDE FISH PASSAGE AND RESTORE ECOLOGICAL FUNCTIONS MAKES SENSE.

As commonly recognized by fisheries biologists and as stated by Brett Barkdull, WDFW fish biologist, "Correction of human-made fish passage barriers is one of the most cost effective methods of salmonid enhancement and restoration." Barkdull, Brett. January 2001. Owl Creek Fish Passage Assessment. p. 1. Roni, *et al.* (2002) found that "reconnecting isolated off-channel habitats or blocked tributaries provides a quick biological response, is likely to last many decades, and based on available evidence, has a high likelihood of success. Generally, these types of restoration activities should be undertaken before methods that produce less consistent results." The replacement of barrier culverts is also cost effective and generally accepted restoration action. The benefits associated with replacement of inadequately functioning culverts are as follows:

A. Immediate Access to Additional Habitat.

Bennett *et al.* 1998 shows that providing fish passage increases the availability of habitat. An increase in habitat decreases density, and therefore increases survival and smolt production. Culverts provide immediate access to additional habitat, thereby increasing survival. (Pess, *et al.*, 2003; Pess, *et al.*, 1998; Barkdull, 2001). The benefits, therefore, are immediate, as compared to other types of restoration efforts that might take years to have an effect, such as riparian planning. Beechie, *et al.* (1994) showed a significant impact on Skagit River coho salmon production resulting from fish passage barriers, particularly in the tributaries. Removal of these obstructions could significantly increase salmon production in the basin. Pess, *et al.* (1998) showed over 250 adult coho salmon were observed above corrected barriers for each of the first two years following culvert replacement.

B. Higher Level of Confidence in Design.

In contrast to other salmon restoration efforts, the science about moving fish upstream is more developed. Although there are uncertainties about passing juvenile fish upstream that should be evaluated through adaptive management, the state of knowledge about fish passage and culvert design is such that we have the ability to design crossing structures, *e.g.*, bridges and culverts, with a high level of confidence such that they will allow adult fish to have unimpeded passage at most flows where fish need (or seek) passage.

C. Easier monitoring.

Monitoring for effectiveness of culvert replacement is much easier than for many other types of habitat restoration efforts. Culverts that were complete blockages to migrating adult salmon can be readily sampled to determine if salmon are present where prior to replacement they did not exist. Estimates of densities or presence of juvenile salmonids can be readily monitored as well. The same can be said for measuring the physical results of culvert replacement. Habitat measurements can be confined to a relatively small portion of stream length, and the number of parameters to be measured, *e.g.* slope, presence of substrate within the culvert, and impacts to upstream and downstream portions of the stream channel, can be rather limited and well defined.

D. Minimal Impacts on Land Use or Private Rights.

The installation of a culvert generally requires little changes in surrounding land use. The footprint for the installation is generally within existing rights of way, so impacts to private landowners are minimal. This avoids the political or social challenges that often occur when attempting to implement restoration projects that require changes in the activities or properties of affected landowners. Replacement of culverts is generally well accepted by the public as a cost effective measure for salmon protection and restoration.

E. Cost-Effective Strategy.

Culvert replacement has been shown to be a cost effective strategy for the recovery of salmon populations. In evaluating restoration actions, Beechie *et al.* (1996) report:

> removal of access problems (*e.g.*, impassable culverts) appears to be the lowest cost restoration, because an access problem is localized and relatively easy to restore, and smolt production increases are relatively large and immediate.

This conclusion was based on an analysis that evaluated the cost per smolt produced by culvert replacement, construction of groundwater channels, or the introduction of large woody debris structures. Culvert replacements were found to be from 1.7 to 29 times more cost effective than these other two restoration actions.

F. Benefits Throughout Stream System.

The benefits of replacing culverts that are compromising ecological functions such as impeding the movement of wood, water and sediment, extend far beyond the immediate area of the culvert. The avoidance of a debris torrent that might occur because water, wood or sediment cannot pass through a culvert during a storm, has benefits throughout the stream system, and the cost of protecting salmon habitat outweighs costs of restoration both in terms of dollars spent and time necessary for recovery. (Beamer *et al.*, 1998.)

VII. TRIBAL EFFORTS TO PROTECT AND RESTORE SALMON

For many years, the case area Tribes have dedicated a significant amount of time and resources toward the protection of salmon resources. There has been a long history of Tribes working collaboratively and within the confines of both State and Federal law to protect Tribal resources. Some of these collaborative efforts are:

A. Timber Fish and Wildlife and Forest and Fish Program.

This program is an intertribal effort to work with the State of Washington, small and large timberland owners, and the environmental community to protect fish and wildlife resources from the impacts of forest practices activities.

B. Water Resources Forum.

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
IN SEATTLE

UNITED STATES OF AMERICA, et al, Plaintiffs, v. STATE OF WASHINGTON, et al., Defendants.	No. C70-9213 Subproceeding 01-10

TRANSCRIPTS OF PROCEEDINGS

BEFORE THE HONORABLE
RICARDO S. MARTINEZ

October 14, 2009

[Original Page 33]

couple of questions of this witness.

Mr. McHenry, understanding that I've not yet had a chance to review your declaration, you've testified that habitat restoration is a very complex thing. Prior to this litigation beginning, the Lower Elwha Clallam Tribe realized that it needed to do something to address these restoration efforts, correct?

THE WITNESS: Yes, sir.

THE COURT: As you have testified, and as the cross-examination showed, there are many specific areas that could have been addressed as part of that ongoing effort.

THE WITNESS: Yes, sir.

THE COURT: Given the obvious limitation that there are insufficient funds to do everything necessary, your tribe decided to go ahead and fix or address -- try to fix 17 barriers out of the 31 that have been identified in this area?

THE WITNESS: In the Salt Creek watershed, that's correct.

THE COURT: Out of all the things that could have been done, why did they decide to try to fix the barriers as one of their highest priorities?

THE WITNESS: Because when we did the watershed assessment, we found that there were 50 miles of historically active stream that salmon could access in this watershed, and fully half that mileage was blocked by culverts of various ownerships. So to us, we applied our scientific knowledge,

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recommendations from the literature which indicated that when you're going to restore a place like this, you need to go after the barriers first.

THE COURT: In your expert opinion, that was the biggest bang for your buck?

THE WITNESS: Yes.

THE COURT: Thank you.

THE WITNESS: Thank you.

THE COURT: Ms. Foster.

MR. FOSTER: Thank you, your Honor. Yesterday, your Honor, the Court reserved ruling on AT-004 with regard to the last section of that particular report.

THE COURT: It was actually Pages 12 and 13, the culvert correction success, that the State had objected to.

MS. FOSTER: Yes, that's correct.

THE COURT: After listening to the testimony, Counsel, the Court will overrule the objection and will admit those portions.

MS. FOSTER: Thank you very much, your Honor. I also neglected to move for AT-084, which is a hydraulic permit approval, during Mr. Wasserman's testimony, and would so move now.

THE COURT: Is that AT-008-4?

MS. FOSTER: No. It's AT-084.

THE COURT: The Red Cabin Creek?

October 15, 2009

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THE COURT: You may inquire, Counsel.

DIRECT EXAMINATION

By Mr. Nielsen:

Q Mr. Johnstone, where do you live?

A I live at Tahola, Washington, on the Quinault Indian Reservation.

Q Where is the Quinault Indian Reservation located?

A It is just north of Grays Harbor in the mid Washington coast.

Q Are you an enrolled member of the Quinault?

A I am an enrolled member.

Q How old are you?

A I'm 56.

Q Are you a descendent of any of the signers of the treaties?

A Yes. My grandmother was from Hoh River, and our family on the Hoh River side were the treaty signers.

Q And Mr. Johnstone, what do you do for a living?

A I'm a fisheries policy spokesperson for the Quinault Indian Nation.

Q And can you briefly describe in general terms what that means. What is your job? What do you do?

A Well, it generally means that anything that has to do with policy in the fisheries arena, that's what I do. I work directly with the fisheries division and handle any of the policy issues.

Q When you say you work directly with the fisheries division, what is the fisheries division?

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A Yes. When I talk about my Hoh River family, it's exclusive, the only income that my brother-in-law has ever known, and he's 73 years old. It was his entire life.

Q Are there tribal members now who rely on salmon fishing to support themselves economically?

A In the Quinault Tribe, there are several.

Q And does your family still rely on salmon as a source of economics?

A Very much so. I have nephews that fish full-time and work, I guess seasonal work when it's available.

Q Now, in Quinault practices -- well, first off, are you familiar with the role salmon has played in the Quinault culture and tradition?

A Well, in our language, the word for "salmon" is the equal word for "food." It's very much a part of us as Indian people. The salmon were the buffalo of the great plains when there were 60 billion. You know, salmon are our buffalo. It is intertwined within our culture. Our songs, our ceremonies, our subsistence coincide with the salmon. When salmon are not plentiful, we suffer. When salmon are plentiful, we basically are rejoicing, we're happier, but we're also mindful of what that means to us. It means that when they're plentiful, that you take care of your harvest, you take care of your needs, your smoke and your can and your freezing, all of those things. And always, we take care of our elders. We take care of

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those that can't provide for their selves first and foremost: our babies, our grandmothers, our grandfathers and our children, and our elders. That's just the way Indian people are.

Q And salmon is an important part of taking care of the children and the elders?

A Yes, it is.

Q And you mentioned ceremonies. How in Quinault culture is salmon used ceremonially? Can you give us a brief description of that?

A Well, salmon are used in all events as well as all of our foods. Salmon is the center pin, for instance, of our culture. If you look at Quinaults, we have a particular stock of salmon called the Quinault Blue Back, or the Sockeye. It's a Sockeye salmon. It is known actually throughout the world.

It is basically the foundation of who we are. We're talking about a run of fish that once numbered into a million. In the last century, there were runs of a million fish. In the last seven years, we had the lowest run ever recorded, at like 7,200 fish. So our connection is deep. The relationship to the salmon is ever present.

And we use salmon for name givings. We use salmon for deaths, for burials, for recognitions, for birthdays. Ceremonial events, we would use particularly the Quinault Sockeye.

Q When you testified that -- I think you said Blue Back; is that correct?

[Original Page 114]

these projects, about $280,000, that's certainly an order of magnitude below what these DOT projects are costing today.

Q You mentioned prioritization and the development of the prioritization process and the manual.

Why is it important to prioritize culverts for correction?

A Well, we felt it was important so that -- front load benefits. We knew that some projects, you would gain

more fish or access for more fish, so that would be one aspect of prioritization.

There are other aspects of how much it would cost to correct a project, the status of the stocks that were effected, the mobility of those stocks when you were dealing with anadromous fish or only resident fish. So these are all factors that we felt needed to be in the prioritization process.

It basically was a surrogate for a cost benefit, but we felt it did a better job of prioritization than a formal cost benefit analysis.

Q You testified a bit this morning about the Fish Passage Priority Index, and you described a little bit about your role in developing that. I would like to go into a little bit more detail.

What is the Fish Passage Priority Index?

A Well, it is a unique number that is calculated for each barrier culvert. And what that lends itself to is a comparison of numbers from other barriers. The range that is expected with

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utilization of priority index is 1 to 100. The higher the number, the higher the priority. There are six factors within the priority index. I think I alluded to some of those in general terms.

Basically there are three modifiers within the priority index for each species. That is the cost stratification of the project, to correct it; the status of the stocks, whether they are depressed or not; again, whether they are anadromous or not.

And then critical pieces of the priority index are the first three factors. I used the BPH. The BPH represents B, being the passability of the culvert, a rough approximation of that; P, the productivity capability of the species that is being calculated, those being different for each species; and then the habitat that a species would utilize after the correction is made.

Those factors are multiplied together. There's a quadratic root calculated for those factors for each species. And then once those are calculated for each species within a drainage, then those are added together to give you the final PI number for that crossing.

Q How does the Washington Department of Fish and Wildlife collect the information necessary to collect to compute a priority index number for a culvert?

A Well, we've had inventory crews. And those that were inventorying DOT roadways, we receive money from the Department of Transportation to do that work. And basically what starts out

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as a driving roads, looking where those crossings are, looking at the site, taking measurements, assessing whether the facility is a barrier or not.

If it's determined that it's a barrier, secondly, then determine if there's a significant amount of habitat that the barrier's affecting that is 200 meters upstream and downstream.

Once that threshold is met, then an in-depth habitat survey is done where various measurements

are made of the habitat to determine the habitat that is unique to each species being affected.

Q Once you've assembled all that information, what do you do with it?

A Well, through the help of my staff, we developed a database to compile all that information and do the calculations of the priority index. It resides in what is called the Fish Passage and Diversion Screening Inventory Database. That's undergone several names. At one time, it was called SHEAR base.

But all the data for the inventory crews in Fish and Wildlife are compiled there. All of the inventories that we did for counties, the data resides there. And also if we provide technical assistance to grant groups that secure money through the SRF Board, those data also reside there.

Q When you calculate a priority index number for a culvert, do you account for the presence of other fish passage barriers in a watershed?

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A We account for it only insofar as it's recorded as reach breaks in our habitat surveys. When the priority index is calculated, it treats those other barriers as transparent. The reason we do that, we don't know when those other barriers are being corrected. So by treating them as transparent, you do a priority index that looks at potential habitat gain as if all those barriers would be corrected at some point in time.

Q And by "transparent," what do you mean?

A What that means is if you're walking the watershed, and perhaps there may be ten barriers, to look at the total potential, you walk the whole stream past every one of those barriers measuring the habitat, and those become an integral part of the priority index. If you didn't do that, you would only calculate a priority index up to the next barrier, and then you would stop your survey. That wasn't our intent, because that's drawing a conclusion that that next barrier and the eight after that would never be fixed.

Q Optimistic way of looking at things.

If we fix a fish passage barrier culvert in a watershed that has other barriers upstream, will the potential benefit of fixing that barrier be immediately realized?

A Generally no.

Q Why not?

A Well, if you open the habitat and the fish start utilizing or passing the previous barrier, they're going to butt up against,

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in some magnitude, to the next barrier. And of course the amount of that decline in potential production depends on the degree of passability of subsequent facilities.

Q I think you testified you worked for the Washington Department of Fish and Wildlife a little over 25 years?

A That's correct.

Q Why did you stay so long?

A I knew you were going to ask that. I guess the short answer is I just really enjoyed working with people and supervising people that were extremely dedicated to protecting and enhancing the resources of the state. It would have been a very difficult job had you not had good staff working for you to implement good ideas, I guess act as you in your own ideas. It made it real easy.

Q Are some of your staff in the courtroom today?

A Yes, they are.

MS. WOODS: Thank you.

THE COURT: Counsel, before you start, let me ask him one question that may help you also in your cross-examination.

Dr. Sekulich, I haven't read your direct testimony as of yet. But in all the years and all the work that you did, in looking at how to address this very complex problem that everybody wants to fix, if Mr. Monson's client over there came up with a pot of stimulus money, a big pot, would you do anything different than the way you've set it out?

[Original Page 119]

THE WITNESS: In terms of the prioritization?

THE COURT: I don't want to make you nervous over there.

Yes.

THE WITNESS: No, not in terms of the prioritization method.

THE COURT: Thank you.

You may cross-examine.

MR. SLEDD: Thank you, your Honor.

CROSS-EXAMINATION

By Mr. Sledd:

Q Good afternoon, Dr. Sekulich.

A Good afternoon.

Q I'm John Sledd. You'll probably remember we first met underneath the conference table during the earthquake at your first deposition?

A I think Mr. Hallowed was taking pictures.

Q The infamous cellphone pictures.

When you were employed at WDFW, you supervised a unit that goes by the acronym of SHEAR; is that correct?

A Yes. That was a name I coined when I first took the job in habitat management.

Q Can you spell it and tell us what it stands for?

A It started as S-H-E-A-R, which was Salmon Habitat Enhancement and Restoration. That's when we were then the Department of Fisheries and our responsibility was only for salmon.

[Original Page 120]

Q And then in your last year or two with the State, there was some reorganization of the SHEAR program. It sort of morphed into the habitat and passage project section of the technical applications division; is that correct?

A It did. There were some intermediate steps before then.

Q And the SHEAR program, when you were directing it, you produced an annual report, did you not, to describe the activities of the program?

A We didn't start the annual reports until probably the mid '90s, but there were other reports that we jointly did with the Department of Transportation.

Q But there those annual SHEAR reports, for example, in 1997 to 2001 or so --

A That sounds right.

Q And then after the name change, when that became part of the technical applications division, the habitat and passage project section, did that annual reporting continue until you left the department?

A Yes.

Q And you supervised the preparation and did a good bit of work on each of those annual reports?

A Yes. Most of the work was outlined, directing staff to complete portions of the report. That's correct.

Q Now, you started doing habitat work at DFW, I believe you testified, in 1990?

[Original Page 121]

A Actually, it was 1991.

Q And it's your opinion, is it not, that prior to your starting your tenure with the DFW, or the Department of Fisheries, a significant portion or most of the culvert structures that were installed in the

state were barriers from the minute they were installed; is that not correct?

A I believe there was a significant number that were.

Q And that opinion's based on your personal observation of culverts as well as input from your staff while you were with DFW?

A That's correct.

Q The 1990 MOU, Exhibit W-087-B that you were asked about, that didn't enable DFW to do anything that it couldn't have done before, did it?

A No, it didn't.

Q Because, as I believe you say in your declaration, there have been fish passage laws on the books in the state of Washington since the late 1800s.

A That's correct.

Q The 1990 MOU just profiled the need and raised people's awareness of those laws; is that correct?

A That's correct.

Q If you could take a look at Exhibit 87-B. If you could look down at the bottom of the first page. You should see there about four or five lines below the word "purpose," it says, " In order

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to accomplish this purpose, the respective participating agencies hereby agree as follows:"

And then after that for several pages there's descriptions of responsibilities. And to the left of each, there's an agency acronym; is that correct?

A That's correct.

Q And if we turn to the eighth page, in the lower right, there is a long number, T10 etcetera 40. It is the eighth page in.

There's a heading you should see in the middle of the page that says "Fish Passage Barrier Removal and Maintenance Program."

A I see it.

Q The first item under that heading states, "The Department of Transportation was to be responsible to," quote, "maintain culverts and fish passage facilities in a manner which provides continued fish passage for the life of the installation."

Do you see that?

A I do.

Q The Department of Transportation did not in fact maintain all its culverts and fish passage facilities to provide continued passage after this MOU, did it?

A Despite its best efforts, no.

Q As I understand the testimony -- you've been in the courtroom pretty much the whole trial, haven't you?

A I have.

Q There's been some discussions about DOT funding for

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corrections in reference to the I-4 program?

A Yes.

Q That's funding that is appropriated by the state legislature to the Department of Transportation specifically for fish passage barrier corrections, right?

A That's correct.

Q Now, the PI, or prioritization process that you just spoke about a moment ago, is used for prioritizing DOT corrections that are going to be funded with that I-4 funding, correct?

A That's correct.

Q It is not used for prioritizing corrections that are going to be done as part of a road project that happens to have a barrier in the project area?

A That's generally true, yes.

Q In that prioritization process for the I-4 funded corrections, is a culvert with less than 200 meters of upstream habitat treated differently than one that has more than 200 meters?

A In the inventory process?

Q In the prioritization process.

A Yes.

Q And the culvert with less than 200 is assessed, the data's kept in the data base, but it's not prioritized for correction with those I-4 funds?

A In general, that's true.

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Q But do you just write off that barrier and say, we're not going to fix it?

A No, we do not. It's kept on the databases of barriers with the presumption that when there is road work safety mobility projects, for example, that the fish passage barrier will be corrected concurrent with that work.

Q And the reason you do that is because biologically, even though it's a short amount, there's still going to be benefit from correcting that?

A That's correct.

Q In your declaration -- you've still got it up there with you, don't you?

A Yes.

Q Can we look at Paragraph 48? I'm sorry. You probably don't have it.

You state in Paragraph 48 that when DFW formulated its current fish passage regulations for culverts back in the 1990s, there was not much information available on the swimming abilities of juvenile salmon?

A I think I'm in the wrong place there. Is it 48?

Q Excuse me for a second. Sorry about that.

It states, "As of '94, little information was available about the swimming abilities of juvenile salmon, so we used a six-inch trout as the closest surrogate," correct?

A That's correct.

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barrier again, correct?

A Yes. You would want a monitoring program.

I might add to that, though, that the type of correction that you make would determine the, I guess, frequency that you would have to reinspect those facilities to see if they were still passing fish.

Q So if you used correction designs that minimize the chance for hydraulic changes to create an impassable condition, it could lower your monitoring burden?

A That's correct.

Q When I was asking you about the 1997 legislative task force report - or it may have been when I was asking you about the SHEAR reports - you mentioned a number of other reports done jointly with DOT. I want to ask you about one of those.

MR. SLEDD: Madam Clerk, if you could hand the witness Exhibit AT-54, please.

THE WITNESS: What was the number again?

By Mr. Sledd:

Q This is AT-54. It's a Fish Passage Program Department of Transportation Inventory Final Report.

A Can I just look at the screen?

Q That's absolutely fine. Whatever is easier for you.

Did your fish passage program work with DOT and prepare a series of not quite annual, but as time went on became more close to annual progress performance reports regarding the joint work

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between DFW and DOT regarding DOT culverts?

A Yes, we did.

Q And this is one in that series of reports?

A Yes.

Q And if I am correct, it has already been admitted in evidence.

You approved the content of these reports when this were prepared by staff under your supervision?

A That's correct.

Q If we could turn to Page 3 in the final report, the first paragraph. Four lines down there, it states, "One habitat-related cause for weakening of salmonid production, which can be easily resolved, is human-made barriers to fish migrations caused by improper placement of road culverts."

Do you see that?

A Yes, I do.

Q By that statement that it is easily resolved, what you and your staff meant was that fish passage barriers were easier to fix than those habitat problems described in the previous paragraphs, such as hydropower, habitat degradation, easier to deal with than oceanic events; is that correct?

A That's correct.

Q If we could look to Page 2, please, in Exhibit AT-54. In the third paragraph on that page, the next-to-the-last sentence -- are you with me?

[Original Page 132]

A I think so. On my screen here -- is it the last full paragraph?

Q Yes, it is.

A Okay.

Q The next-to-last sentence in that last full paragraph on your screen states, "A total potential spawning and rearing area of 1.6 million meters squared," and some change, "is currently blocked by WSDOT culverts on the 177 surveyed streams requiring barrier resolution. This is enough wetted stream area to produce 200,000 adult salmonids annually."

Now, you were the major player in preparing that statement and doing those calculations, were you not?

A Yes, I was.

Q And those calculations are based on the percent passability, or B factor, the P or production factors, and production coefficients, and the H, or habitat values, that are described in the priority index?

A With the understanding it is all under the umbrella of potential production.

Q Correct. So that is the potential annual adult equivalent salmonid production?

A That's correct.

Q An adult equivalent means that's a fish that actually would end up in either harvest or escapement as an adult?

A That's correct.

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Q So that it's after ocean mortality and other mortality factors?

A Yes.

Q You included that statement about the 200,000 fish in this final report in order to convey to the state

legislature that there was a real benefit to the money the legislature was appropriating for culvert corrections, was it not?

A That's correct.

Q And I believe your declaration describes these factors in the PI and the BPH combination as being properly used only in a relativistic sense, to compare the benefits between one project and another?

A For that purpose, and also to compare correction schedules, where it's still a relative comparison.

Q This 200,000 additional salmon statement was not comparing the relative benefits of two projects, though?

A It was not, but it was a result of a cost benefit analysis that I did at that time.

Q But it was not comparing two different projects?

A No, it was not.

Q And it was not comparing two different schedules?

A No. It was a result of such analysis.

Q But it's not stated in the report?

A That's correct.

Q You said this is an outgrowth, I believe, of a cost benefit

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analysis?

A That's correct.

Q And you did that analysis?

A Yes.

Q But in your opinion, it's impossible to do a cost benefit analysis on a single culvert and determine what the benefit of the fish coming back to a single correction is?

A I don't think it's impossible, but it's very difficult.

Q Dr. Sekulich, I'm going to read to you the question and response from your deposition of April 22nd of 2009, Page 69 at Lines 3 to 9.

Question: "So the legislature, you think, wanted a project-by-project cost benefit?"

Answer: "Yes."

Question: "And you didn't think that was possible?"

Now, if you wanted to do a cost benefit on the overall programatic level, not individual culverts but the whole correction program, you believe you could do that?

A I believe it's much easier and it makes more sense.

Q And if you wanted to do that, you don't know of any better method to do than the BPH method, the percent passability, the cost of production coefficient times the habitat areas, do you?

A In my opinion, on an individual project, the priority index methodology is the best.

Q And if you want to prepare an estimate for the entire

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program, you don't know of a better methodology than that?

A Than the priority index methodology or the cost benefit analysis?

Q Than the BPH methodology that's a portion of the priority --

A It's a portion. I think it's a good methodology, yes.

Q And you don't know of a better one to come up with a cost benefit for the entire --

A Not without thinking about it more, no.

MR. SLEDD: If we could have on the screen, please – if I could have the clerk deliver to Dr. Sekulich Exhibit AT-154?

I'm sorry, your Honor. It's not admitted yet, so perhaps I should have it on the screen and not publish it to the witness.

By Mr. Sledd:

Q I'll botch this, but it's my last question.

A Are you hoping it's a good one?

Q It's a doozy.

Do you recognize that document, Dr. Sekulich?

A I do.

Q And it has your name on it underneath the title, correct?

A Yes.

Q And is that a document that -- the date down there, November 9th, 1999, do you see that?

A Yes, I do.

Q And that was during your tenure with the Department of Fish and Wildlife?

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it, in addition to the information about the designs of these projects.

THE COURT: Thank you, Mr. Shaftel.

Let me ask a couple of questions, Mr. Wagner. Looking at 092. Not the one on the screen, 113, but 092, this is the earlier version you've indicated?

THE WITNESS: That's correct.

THE COURT: Mr. Shaftel says that 113, the one on the screen, was not available to you at the time your declaration was put together.

THE WITNESS: That's right. This is an update to those cost estimates.

THE COURT: Who creates this document?

THE WITNESS: This table itself is created as a summary by my staff.

THE COURT: Your staff?

THE WITNESS: Yes.

THE COURT: All right, gentlemen. The Court will overrule the objections, and 113 will be admitted.

By Mr. Shaftel:

Q Now, Mr. Wagner, I'd like to ask you a couple questions about the scoping that's reflected on this particular document. Why did we do all this scoping?
A Scoping is very important to get a handle on what the costs would be as well as to get agreement on the type of fix. Our

[Original Page 26]

intent here is -- as I mentioned, the fish passage program has evolved as we've worked to improve it over the years. One of the things that we're working on is to really emphasize scoping so that we have more projects that can move on to design and more projects that are ready for construction ultimately.

Q And do you know how many projects -- I'm sorry. Is this a comprehensive list of everything in the scoping process?

A No, it's not. We have scoping -- projects that are in the scoping process that haven't been brought to the completion that these have, and we also have projects that have been scoped in other geographic areas.

Q And do you know how many projects were listed on this particular scoping list?

A It says 38 projects.

Q Have you calculated what the average cost reflected in the "Estimated Cost" column is?

A Yes. The average cost of all those 38 is about $3 million.

Q And I notice there's one project on here that seems quite a bit higher than the rest. It's SR 3 Chico Creek at $29 million. Have you also done a calculation that would remove that extremely higher cost?

A It is a very high-cost project. If we took that out and averaged the remaining 37, it would be an average of $2.3 million apiece.

Q And how do you think this sample of approaching projects

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compares to other remaining projects that have yet to be scoped but would still need to be corrected by the Department of Transportation, in terms of the size of the projects?

MR. JOHNSEN: Objection, your Honor. This is beyond the scope of anything in his declaration. His declaration is his testimony. It is not a summary.

MR. SHAFTEL: Your Honor, I believe he talks about costs and how they've changed over time. He talks about the number of barriers that are remaining. He's just merely -- trying to provide context for this particular document and the costs reflected.

THE COURT: Overruled.

You may respond. Do you do you remember the question?

THE WITNESS: Could you repeat that, please?

MR. SHAFTEL: Yes.

By Mr. Shaftel:

Q How does the averages that you just mentioned -- or, I'm sorry, how does the list that you see here and the size of the projects reflected here compare to the size of the projects that have yet to be scoped or

corrected but still need to be corrected by the Department of Transportation?

A I think these are pretty typical of projects that we are scoping now and have not concluded the scoping to. We are definitely finding as we go into our list we are adding more and more complex projects, and there may be a number of very high

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mischaracterizes Dr. Sekulich's testimony. I believe he said some of them may have been. I don't believe he said almost all of them.

THE COURT: The objection to the form of the question is sustained.

By Mr. Johnsen:

Q Do you recall Dr. Sekulich testifying about fish passage barriers in the case area last week?

A I do.

Q Do you disagree with any part of Dr. Sekulich's testimony regarding the passability of Department of Transportation culverts in the case area in the last week?

MR. SHAFTEL: Objection. Overbroad.

THE COURT: Overruled.

THE WITNESS: Not that I can recall.

By Mr. Johnsen:

Q Going back to Page 5 of your declaration, Paragraph 9. This, I think, is just a clarification point. You make reference in that paragraph to the industry -- it is right at the bottom, Line 26, the industry standard for

the design of road culverts for hydraulic purposes. Do you see that?

A Yes.

Q In making that statement, are you using the word "hydraulic" there in the sense -- the ordinary sense of conveying liquid

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through a pipe, rather than referring to the hydraulic method of designing culverts?

A That's correct.

Q So you are not saying that the manual that you are referring to in Paragraph 9 contained any direction on how to construct a hydraulic fish passage culvert; is that correct?

A That is correct, I am not saying that.

Q And isn't it also true that the standards for fish passage that the Department of Transportation uses are set by the State of Washington Department of Fisheries and not by the Federal Highway Administration?

A That is correct.

Q Turning to Page 9. On Page 9, you are talking about the inventory of the Department of Transportation culvert sites. And you testified about that some this morning as well. You state there that the inventory is now complete; is that correct?

A That's correct.

Q Although the inventory is complete, habitat assessments still must be completed on a majority of

the department's fish passage barrier culverts; isn't that also correct?

A That's correct.

Q Is it true that about two-thirds of the culverts remain to have habitat assessments on them?

A I believe that is about the number, yes.

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Q Now, you testified earlier this morning about the scoping process. Do you recall that?

A Yes.

Q And you said that a portion of that process involves coming up with estimates of possible project costs. Is that also correct?

A Yes.

Q And isn't it true that those estimates are not done with the same rigor that would be done if the project was being put out to bids, for example?

A I'm not sure about the word "rigor" in that. They're for different purposes. The scoping estimate is a rough estimate. It's based on engineering principles, but it doesn't involve the detailed analysis that would --

Q Right. So it's a rough estimate compared to the actual estimate that an engineer prepares when a project is going to be put out to bid by the State Department of Transportation?

A Yes.

Q And in fact, in the scoping process, those estimates are used primarily for comparison purposes when

you're comparing the different possible solutions to the problem that's presented? Isn't that also correct?

A They can be used that way.

Q So if you are considering a retrofit, what's the rough cost of that compared to a rough estimate of the cost of a bridge or a

[Original Page 54]

stream simulation culvert, people come up with numbers for that; is that correct?

A Through the scoping process.

Q Right.

Now, I think you testified that there are some 32 projects in the Scoping Summary Report that's Exhibit 113.

MR. JOHNSEN: Could you put up W-113, please? Did I get the number wrong? It's the one we substituted for 92-J.

THE COURT: Counsel, this might be a good time for our morning recess.

MR. JOHNSEN: Thank you.

THE COURT: We will take our morning recess.

(At this time, a short break was taken.)

By Mr. Johnsen:

Q Mr. Wagner, in front of you on the screen is the second page, the exhibit that we were talking about prior to the break. And this is the page where I believe you testified sets out the barrier culverts that have been scoped for correction in the case area; is that correct?

A Yes. These are projects in the case area where we've completed the scoping process. I can't see the whole document here.

Q That's so we can read the part that is here.

A Okay.

Q You have, I believe, access to a paper copy, if you prefer

[Original Page 59]

A Okay.

Q So 38 of those are shown on the exhibit that's on the screen in front of you; isn't that correct? That's your count?

A Yes.

Q You testified that you felt these 38 were a representative sample of the 800 that remained to be corrected. Do you recall saying that?

A Yes.

Q What did you base that testimony on?

A On my general awareness of these projects and on the discussions we have had about the scoping effort with my staff and with the Department of Fish and Wildlife staff.

Q You have available to you in the course of your work access to the Fish Passage Diversion Screening Inventory Database, do you not?

A We use that database. I don't personally run analyses on that.

Q That's a data base maintained by the State Department of Fisheries that includes all of the

Department of Transportation barrier culverts as well as information on other culverts; isn't that correct?

A Yes. Department of Wish and Wildlife, yes.

Q So when you reached your conclusion that you testified to here in court today in this case, did you consult that database to determine whether in fact these 38 projects are representative

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of the remaining 800, as reflected by the data in that database?

A If I'm understanding your question, you're asking me if we looked at that larger database to see if these are reflective of that?

Q Yes.

A I don't believe we've done that analysis.

Q Why not?

A We have been busy with other tasks.

Q Really?

Okay. Well, so you have a general feeling that this is consistent with those 800, but you haven't undertaken any kind of analysis of the data to support your opinion; is that correct?

A These projects represent a range of the stream conditions, streams of different sizes, different locations in the case area, different watersheds reflecting different levels of development, and so this list -- these are the kinds of projects that we're scoping, that are in the process of scoping now that

haven't reached completion, and my sense is that these are fairly typical of the types of projects we see.

Q Could you please answer the question that I asked?

A I'm sorry. I guess I need to have that question again.

MR. JOHNSEN: Can the reporter read back the question.

THE COURT: Actually, Counsel, I think he did answer it. Ask him another question.

By Mr. Johnsen:

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Q How many of the projects on the list here involve bridges?

A I don't know the number off the top of my head. We've indicated bridge corrections in the description of the proposed solution.

Q Scanning down through it, I see a 200-foot bridge, an 80-foot bridge, a 30-foot bridge.

Is it your opinion that the number of bridges that are reflected in this exhibit is representative of the number of bridges that will be required to address the 800 culverts that remain to be corrected in the case area?

A I'm not sure how to answer that question.

Q Isn't it true that the reason you can't answer it is that you haven't undertaken the analysis that would allow you to answer it?

A Well, a bridge is a method of correction that could be chosen at a number of different locations. A bridge is a specific kind of structure that could be used at a

number of spans. And so some of these projects where we say replace culverts with stream sim design, those may in fact be bridge projects as well. We could -- you know, it would be replaced with a bridge structure.

THE COURT: Mr. Wagner, I think the question was a lot simpler than that. There are bridges on this list of 38, right?

THE WITNESS: Yes.

THE COURT: And you said earlier that you thought this list was representative of the 800 that need to be corrected?

[Original Page 62]

THE WITNESS: Yes.

THE COURT: Do you think the numbers of bridges are also representative of that 800, the 38 on here, three bridges, roughly ten percent?

THE WITNESS: It's very possible, yes.

By Mr. Johnsen:

Q You have available to you through the database stream width measurements, do you not?

A Yes.

Q And those stream width measurements are a major factor in deciding the size of a culvert, or a bridge for that matter, that will be used to solve the barrier problem; isn't that also correct?

A Yes.

Q Isn't it true that the database indicates that approximately 80 percent of the current barrier

culverts could be addressed with a stream simulation culvert that is no larger than 16 feet in width?

MR. SHAFTEL: Objection. Foundation.

THE COURT: Are you referring to the Fish Passage Diversion Screening Database?

MR. JOHNSEN: Yes.

THE COURT: All right. Overruled.

THE WITNESS: I'm not sure about that. I would need to look at the database.

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By Mr. Johnsen:

Q And you have not done that in support of your opinion regarding these culverts; is that correct?

A No, sir.

Q If that is true, if 80 percent of the barrier culverts could be addressed with a stream simulation culvert 16 feet in width or less, is that fact reflected in this exhibit?

A I don't believe so.

Q And in fact, there is a much greater proportion in this exhibit of much larger crossings, is there not?

A Because we are working down the priority index, streams that are larger sizes are going to tend to have a higher priority.

Q And that makes this not representative of the future problem, doesn't it?

A Well, very often it may take a large structure to cross even a small stream, depending on the terrain,

the roadway, the depth of roadway fill and other factors that are the realities of the situation on the ground.

Q The projects that were done this past construction season, are they in fact all complete at this point?

A Some are complete. Some are still in their final stages with vegetation work and some other kind of final steps happening to them this fall.

Q Have they passed final inspection?

A They have passed the inspection from our construction

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Q Are you familiar with that culvert?

A A little bit. I haven't been to the site. Since it is not an I-4 project, I wasn't very involved with that.

Q Was it prioritized for correction?

A I believe it has a PI, yes.

Q And is it true that the contract amount for correction of that culvert in this construction season was $546,628?

A I don't know that for a fact.

Q Would you look at Exhibit AT-333, please? Do you recognize this document?

A I believe I saw this for the first time last night.

Q Right. Probably shown to you by Mr. Shaftel, correct?

A Yes.

Q I will represent to you this is a document that I found yesterday on the Department of Transportation's website and provided to Mr. Shaftel, indicating that it's a construction contract report for the Cougar Creek culvert replacement project that you referred to as being completed this year.

This document also shows an engineer's estimate, does it not?

A It does.

Q About $400,000 higher than the actual contract amount?

A That's right.

Q And you testified earlier that the sort of rough estimates that are involved in the scoping reports aren't done with the same level of rigor and analysis as an actual engineer's estimate

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when a project goes out to bid.

Do you recall that?

A Yes.

Q The Mosquito Creek project outside the case area but still a culvert that was repaired this season, are you familiar with that one?

A To some degree.

Q That was done under your program?

A Yes.

Q You are not familiar with the actual project?

A I am familiar with the project in general. I haven't been to the site, if that's what you're asking.

Q That's on US 101; is that correct? And construction of that project required closure of US 101 while it was being built; is that correct?

A I am not specifically familiar with that.

Q Where on 101 is it located?

A In Aberdeen.

Q Does the culvert run entirely under US 101?

A I am not specifically familiar with that.

Q The contract for that project was $728,34- -- excuse me, $728,349.25, wasn't it?

A Again, I'm not familiar with those -- with that particular number.

Q This is done under the program you manage; is that correct?

[Original Page 69]

A Yes.

Q Did that contract that you administered seem to be about $730,000?

MR. SHAFTEL: Objection, lack of foundation.

THE COURT: I think he has answered the question, Counsel. He is not particularly familiar with it.

By Mr. Johnsen:

Q Would you look at Exhibit AT-334? This appears to be the construction report for the Mosquito Creek project that we have just been discussing?

A It appears to be.

Q Do you recall that the contract amount when it was actually awarded was substantially lower than the engineer's estimate in this project as well?

MR. SHAFTEL: Objection. Lack of foundation. This witness has not testified that he had any previous knowledge on that issue.

THE COURT: Overruled.

THE WITNESS: I know from talking with my staff that we had a number of projects that came in this season under budget -- or under estimates.

By Mr. Johnsen:

Q Under estimates. In fact, every one of them did?

A Yes.

Q The estimates were uniformly high?

[Original Page 72]

what goes into these numbers.

THE COURT: All right. Which ones are you asking to admit for that limited purpose?

MR. JOHNSEN: 332 through 336.

THE COURT: Is 337 one of these as well?

MR. JOHNSEN: It is.

THE COURT: So through 337?

MR. HOLLOWED: Yes.

THE COURT: For that limited purpose, no objection?

MR. SHAFTEL: Just for the limited purpose of showing the difference between the bid amounts.

THE COURT: I understand. 332 through 337 will be admitted. By Mr. Johnsen:

Q Mr. Wagner, another of the projects was on State Route 122. Would you look at Exhibit 337, please?

Does the title -- the contract title there refer to the project that you were referencing when you said that a Mayfield Lake project was done this year?

A Yes.

Q That is the same project?

A That's correct.

Q Now, for the four projects that were done under the Nickel Program, the two on Tibbetts Creek and the two on Burly Creek, those would fall into the category of we really don't know how

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much the culvert aspect of those cost because it was to know as part of the larger project; is that correct?

A That's my understanding, yes.

Q So we have in these Exhibits 332 through 337 both the contract amounts for construction for the projects for this season, where data's available on the cost, and the engineer's estimates for each of those projects; is that correct?

A That appears to be so.

Q I will move on to a different subject. Back to your declaration. On Page 12, as it happened, when you were doing the declaration you said that you received

a call on a project – I think it's actually two projects, that you had planned for this year's construction season that caused a delay, and they were located in Poulsbo. Do you recall that?

A I do.

Q Now, the objection that the City of Poulsbo had was that they didn't want the department to be closing a state highway through Poulsbo for construction and requiring traffic to go on other city streets to get around the construction; isn't that correct?

A Yes, that is my understanding.

Q And they were going to actually deny you the use of those other streets for this construction season; isn't that also correct?

A Yes.

[Original Page 92]

number, because for the purposes of the case we have taken out some barriers that were for resident-only fish.

Q But the proportion -- the two-thirds proportion that fixes problems is about the same, if I didn't butcher that question so badly that you couldn't understand it?

Let me try again. About two-thirds of the barrier culverts are located in the case area and about two-thirds of the fixes are in the case area; is that correct?

A Roughly, yes.

Q Now, in terms of the future, based on your testimony today, is it true that you can't -- you're not able to tell the Court by what year the Department of

Transportation plans or intends to have corrected the 800 fish passage barriers that exist in the case area?

A That's correct.

Q And you're not even able to tell the Court the rate at which the Department of Transportation plans or intends to correct those barriers. Is that also correct?

A Well, we put together our ten-year plan to show what our intent is and what we would be prepared to do if funding were available. But ultimately our rate is determined by funding from the legislature, which we don't control.

Q And the ten-year plan is also based on funding that you know or anticipate at this point; isn't that correct?

A Well, our ten-year plan is identifying corrections that we

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think could be accomplished in that timeframe, ones that we think would be appropriate to be working on and are staged to be ready for delivery on the schedule that we're laying out there.

Q And those ten-year plans appear in the annual progress reports each year, don't they?

A They appear -- in 2006, we were still using a six-year plan. And subsequent to that, we expanded the program to a ten-year plan.

Q But the current ones have a ten-year plan in them?

A Yes.

Q Beyond that, you don't know what the rate would be; is that correct?

A Depends on funding.

Q And even within the ten years, it still depends on funding, doesn't it?

A Yes.

MR. JOHNSEN: Thank you, Mr. Wagner.

THE COURT: Redirect for Mr. Wagner?

REDIRECT EXAMINATION

By Mr. Shaftel:

Q Mr. Wagner, we've done quite a bit of talking about the ten-year plan, but I don't believe you've actually shown the Court what we're talking about.

Can you look at the monitor there and tell me what is this on the monitor?

[Original Page 106]

A We do.

Q What is that system?

A We contract with the Department of Fish and Wildlife to do annual fishway inspections, and those are reported on as part of our annual report.

Q And why does it have that system in place?

A It's important to keep after those, because they do require maintenance, they do require ongoing monitoring.

Q In fact, of the 49 mentioned, aren't a number of those, or a great deal of those, the fishways that you're monitoring over time?

A Yes.

Q I would like to turn your attention to Page 5 of your declaration, Paragraph 9. I believe you were asked a question about what you meant in this paragraph here relating to the Federal Highway Administration HEC 10 document and whether or not the DOT in fact looks to the Federal Highway Administration to provide fish passage standards or whether or not it looks to state guidelines.

Do you remember that question?

A I do.

Q What was your intent by making a mention of HEC 10 in this paragraph?

A In terms of engineering guidance, Washington State DOT and other DOTs do look to the federal highways for basic guidance for

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engineering design. And my point in bringing this up was that this is really, to date, the only manual or direction that's been provided for how to design culverts from the Federal Highway Administration.

The focus has been on design for hydraulic capacity not just to kind of carry water. And in my declaration, I mention that just in the last couple of years, the Federal Highway Administration has issued a synthesis document that's sort of an analysis of the state of the art for fish passage but has yet to put out a manual or a direction on how to incorporate that into hydraulic design.

Q And so did the Department of Transportation historically rely on the HEC 10 document?

A Yes.

Q And that document didn't mention anything on whether or not those culverts that were being installed by the Department of Transportation, consistent with those guidelines, in fact metfish passage standards; is that correct?

MR. JOHNSEN: Object to the form of the question. It's leading.

MR. SHAFTEL: It's redirect.

THE COURT: The objection is sustained.

By Mr. Shaftel:

Q Did the department -- I'm sorry. Did the Federal Highway Administration ever inform the Department of Transportation that

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HEC 10 standards did not, in some cases, allow for fish passage, to your knowledge?

A Not to my knowledge.

Q You were asked a number of questions about projects that are 16 feet or less in width size and projects that have yet to be performed that are still on the list.

Do you remember that set of questions?

A Yes.

Q There was a representation made to you that assumed that 80 percent of the culverts in fact could be addressed with a 16-foot width or less number.

Do you remember that question?

A I remember that question.

Q My question to follow up on that is whether or not the width of a culvert is the only driver of costs.

A It's definitely not the only driver of costs. There are similarly significant cost factors related to the depth of fill that's over the culvert, to the length of the culvert itself, to the traffic on the roadway, real estate, right-of-way issues, access issues, all can be significant cost factors.

Q Can risk be a cost factor? Do you know what I mean by "risk"?

A Yes.

Q What do you understand me to mean?

A The chance of something in the project not going as planned,

[Original Page 124]

I think the earlier question was about the general concept of fish passage corrections being added to safety and mobility projects as a means of efficiently correcting barriers.

Q So in your mind, it is added if it is required by state law but not something the department would otherwise do; is that correct?

A Added to the scope of the project.

MR. JOHNSEN: Thank you.

THE COURT: Do you feel a little bit Matt Hasselbeck up there?

Mr. Wagner, you may step down.

MR. MONSON: Your Honor, Peter Monson. I think I have just a couple questions.

THE COURT: Oh, great. All right. Are you ready now?

MR. MONSON: I will be brief. Yes.

RECROSS-EXAMINATION

By Mr. Monson:

Q Good afternoon, Mr. Wagner. I'm Peter Monson. I represent the United States in this case.

There was a couple of questions that you were asked on redirect regarding the HEC 10 standards, or a guidance document. Do you recall those --

A I do.

Q -- that your counsel asked you?

The HEC 10 manual is a hydraulic manual, is it not?

[Original Page 125]

A Yes. "Hydraulic engineering circular" is the acronym.

Q Thank you. Does it have any statements in there regarding the design criteria for fish passage?

A Not to my knowledge.

Q You indicated both on redirect and in your written testimony that "At no time has FHWA notified WSDOT that the federal design standards failed to provide fish passage for the culverts design pursuant to the standards might violate treaty fishing rights." Do you recall writing that statement?

A I do.

Q Has the FHWA ever notified WSDOT that the federal design standards were sufficient to meet the fish passage?

A Not to my knowledge.

Q Is there anything in the HEC 10 circular that precludes the State from modifying the design standards to accommodate local conditions, such as fish passage?

A Not that I'm aware of.

MR. MONSON: No further questions. Thank you.

THE WITNESS: Thank you.

THE COURT: Mr. Shaftel, anything else from the State based on the questions from the government?

MR. SHAFTEL: No questions.

THE COURT: Mr. Wagner, you may step down. Thank you.

Counsel, let's take our break.

(At this time, a short break was taken.)

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removing the culverts. Is it your opinion that you have to know the actual number of fish increase to know what you're doing has a benefit to fish?

A No, I don't think you do.

Q Has parks completed their inventory of culverts?

A No, I don't believe they have.

Q Did they used to have a contract with WDFW and it terminated?

A Yes.

Q Do you know anything about the costs of different culvert designs, say between hydraulic and stream simulation?

A Only in a general sense.

Q In terms of a culvert project, I have been told often the highest cost involved manpower, the diversion of the roads, and other types of costs would essentially be constant between two types of culvert fixes.

Is that your understanding?

A If you are getting to the size of the culvert, it is not the largest influence in the cost of the project, that can be true, yes.

Q In fact, you testified earlier if you're doing an open cut, there really isn't much difference between stream simulation and the cost of a hydraulic culvert; is that correct?

A I don't believe so, no.

Q Because the idea is if you're digging up the road anyway and you're diverting the traffic anyway, that this is just a

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difference in size of the culvert; is that correct?

A There's a small monetary difference, but I think relative to the overall project cost, it would be small.

Q I believe you heard Mr. Wagner testify earlier about WDFW monitoring fish passage barriers; is that correct?

A That's correct.

Q Isn't it just 1-4 projects that are monitored currently?

A That is correct. We only do a compliance inspection on those projects that were constructed using other funding sources. We do not do any followup monitoring other than those that fall within the category of a fishway retrofit. Those, we will inspect annually.

Q Because fishways have lots of problems, right?

A That's correct.

Q So you can't just walk away from a fishway?

A No, you can't.

Q But for the rest of the culverts, nobody's going out to look at them to see if they're currently complying with fish passage?

A No. Nobody from WDFW.

Q Are you familiar with the scoping work for the Highway 3 crossing at the mouth of Chico Creek in Kitsap?

A A little bit.

Q Are you aware that this is a pretty expensive project, around the range of $31 million?

A Yes.

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Q Is it a good project?

A Yes, it is.

Q And why is it a good project?

A There's a significant amount of habitat upstream, and Chico Creek also is a significant Chum Salmon producer in that area.

Q So from your perspective, it is high cost but well worth it?

A It's a good project, yes.

Q Are you responsible for the collection of data regarding DOT culverts in the case area?

A Ultimately, yes.

Q Basically it's done by field crews?

A Yes.

Q And one of the elements that the field crews measure is lineal salmon habitat upstream?

A Lineal gain upstream.

Q And they measure spawning area?

A Yes.

Q And rearing area?

A Yes.

Q And they put this all into a database called the FPDSI; is that correct?

A That's correct.

Q And you testified that WDFW calculated PI values for some of the culvert sites in the case area?

A Yes.

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asked if it's reasonable to rely on certain parts of the document. I'd like to know what he thinks about the -- if he thinks the document is acceptable.

Can you go ahead and put up 156?

THE COURT: You may proceed, Ms. Rasmussen.

RECROSS-EXAMINATION

By Ms. Rasmussen:

Q Mr. Barber, Ms. Woods asked you about numerous portions, including the cost estimate that was done in 1997 and the number of culverts and a couple of other items that she asked you if it was reasonable to rely on, and you said no.

Is that the extent of the parts of the document which are not reasonable to rely on?

A I think there are other components of it that could be questionable.

Q Is it questionable, the statement in the first paragraph, that "Fish need habitat, but if they cannot reach spawning and rearing areas, then the full potential of the habitat is not achieved and depressed, and even healthy fish stocks decline to levels that cannot support utilization objectives and even levels of extinction"?

A I think that statement's correct.

Q And No. 2, that state law requires fish passage, is that no longer correct?

A No, that is still correct.

[Original Page 10]

Q And you didn't state any opinion about the miles of road crossings that were estimated, did you?

A No, I didn't.

Q Is it still true there is a need to accelerate fish passage corrections?

A I believe so.

MS. RASMUSSEN: No further questions. Thank you.

THE COURT: I believe you may step down. Thank you.

THE WITNESS: Thank you.

THE COURT: Do we have a new witness?

MS. RASMUSSEN: Your Honor, I believe we have to deal with the rest of the objection back-and-forth of Ms. Woods and I on AT-236.

THE COURT: Let's deal with AT-236. That's the Fish Passage Inventory and Corrections Status Summary.

MS. WOODS: Your Honor, we maintain the objection to that document. As indicated in Mr. Barber's answer, that document was prepared for litigation. It was not prepared by an agency employee within the scope of his normal duties. It was prepared for litigation.

THE COURT: Ms. Rasmussen?

MS. RASMUSSEN: Yes, your Honor. This is essentially the quintessential admission. They created something and now they no longer like what

they created, and so they want to take it back. But under the -- it's not hearsay under 802 (d)(2)(b)

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want to make that stream simulate the outside of the stream when you're doing the culvert. But in terms of their size, would it be fair to say that a stream simulation culvert would, in the main, be wider than a no-slope culvert?

A Are you talking about the span or the width of the bed?

Q The width of the culvert. The culvert would, as I understand the formula, would create a culvert slightly wider than the bankful width with respect to a stream simulation. Is that true?

A Yes, although that may not be true in terms of the culvert span. But we will make it simple, and I'll say yes.

Q Good. I appreciate your help on that.

My question goes one more, though. If I'm going to install both of those and I'm going to have to dig a hole to put it in, and I put a coffer dam up so the water doesn't come through when I'm working on it, and I've got to buy flaggers, and I've got to buy -- whatever I have to buy to make this happen, there really isn't much difference in the cost between a stream simulation and a no-slope when you decide to install one or the other?

A In a public works project like you'd find on a public road, the cost of the culvert is relatively small compared to the overall project costs. Now, on a forest road, that is not the case any longer.

Q In terms of Department of Transportation, which have public work highway kinds of projects?

A That's exactly right. The guardrail probably costs more than

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the culvert does.

Q Thank you.

A I shouldn't have said that.

Q I think I understand. It's relatively small.

A Yeah. There are all these other elements into these things which are very costly, and traffic control being one of them.

Q You developed stream simulation when it wasn't there before?

A Right.

Q Is it fair to say that culvert design methodology, science, is evolving?

A Yeah.

Q And you would expect, then, that some day, sooner or later, somebody might have an improvement to stream simulation?

A They might.

Q It may be you?

A It may be me.

Q I understand you're doing some studies right now?

A That's right.

Q So that applying some sort of an adaptive management or continuing to look at the process would make sense from a scientific point of view?

A Well, if my experience with the forest and fish adaptive management program is any example, I would say no.

Q Let's leave forest and fish out for a moment and just look at the concept of continuing to look at the science that exists

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methods.

Q Right. I put it as more of illustrative. I didn't --

A Yeah. What we're showing is this continuum, just on the basis of width, between the smallest, least expensive, but having the greatest ecological effects, to one which has the greatest benefit, showing that continuum.

MR. STAY: And again, a second time, thank you very much. I have nothing further, your Honor. Mr. Monson has a few questions.

MR. MONSON: Thank you, your Honor.

RECROSS-EXAMINATION

By Mr. Monson:

Q Mr. Barnard, I'm Peter Monson. You last saw me probably on a little black box on a speak phone at your deposition. It's a pleasure to meet you in person.

I just have a very few questions. I can't help but comment that your enthusiasm for the stream simulation method is very infectious.

A Well, one of the federal agencies, the Forest Service, has written an absolutely stunning guidance manual on stream simulation.

Q Well, thank you. You just answered my next question. I appreciate that.

A I was one of the major reviewers for that guidance manual.

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Q Excellent.

And the Forest Service has a slightly different technical approach, does it not?

A Oh, that. Well, we're headed to the same place. We're headed to simulating natural stream conditions inside the culvert. We're both going to the same place, but they get there with a level of rigor which is way beyond what we require.

Q That's good to know. Thank you.

Now, the National Marine Fisheries Service has also indicated a preference for the stream simulation methodology, right?

A Yes.

Q And they have an approach that's also ended towards the same goal. They calculate the --

A It's headed towards the same goal, although they use – I want to remember this correctly. They use a simple factor to relate the bankful channel width to the culvert bed width. I believe it's 1.3.

Q From a fish's perspective, it probably looks about the same?

A Well, actually, one of the problems with it -- do you want to know what the problems with it are? Do you want me to go into this?

Q I don't really want to get into too much detail. I wasn't really looking. I was just wanting to make a point that they have developed similar methodology.

A They have a criteria as well.

[Original Page 127]

fish passage and culverts called -- I think it's called HEC 26. I just read a final draft of it a couple of weeks ago.

Q Does the Federal Highway Administration also indicate a preference for stream simulation culverts?

A Well, actually, the draft I read of HEC 26, they recommend a culvert design method based on sediment stability.

It was very disappointing. I read the initial draft of this. They are adamant. It's sort of an engineering-based design. It is kind of like -- it's basically kind of a velocity sort of design based on sediment stability.

Q From a fish passage perspective, you still continue to believe that stream simulation is the best?

A Oh, yeah.

MR. MONSON: I have no further questions. Thank you.

THE COURT: Any redirect, Ms. Woods?

MS. WOODS: No redirect, your Honor.

THE COURT: Mr. Barnard, before you step down. I appreciate your enthusiasm for all this as well.

Thank you. I have a question that may not make a lot of sense. Maybe it's my lack of understanding here.

THE WITNESS: It's a complicated business.

THE COURT: I assume that most of the streams that we're talking about that have these barriers drain into either Puget Sound or the Pacific Ocean, correct?

THE WITNESS: You're talking about the case area?

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thing is to have a comprehensive look of integrating all those Hs and the processes connected to them into one particular way of looking at fingerprinting the watersheds. In other words, how do those comprehensive uses fit together to give you the best bang for the buck for salmon recovery.

Integrating into the watersheds would allow you to fingerprint which part of the H needs to be done at which particular point in time, and how they all fit together in the watersheds will become much clearer than they are right now. In some cases, you have people competing for funds because they want to address one H over the other H, and there just isn't that much money to go around to do that.

In my particular view, and the co-managers in the state of Washington have been trying to do this, we just haven't had the money and the personnel to get it done, given all our other responsibilities, is to begin to form an integrated look to what needs to be done in each one of the watersheds so we have a

comprehensive plan of moving forward. That would be the starting point, and then you could take your bushel of money and begin to apply it to those particular priority needs.

That would be, if I were ruler of the world for ten minutes, my view of it.

THE COURT: In your opinion, that is not occurring right now?

THE WITNESS: In my opinion, that is not occurring to

[Original Page 86]

the degree that it needs to occur. That's correct. It has not been done on a systematic basis.

THE COURT: And when we talk about that integrated look, I'm sure you are including the tribes as well?

THE WITNESS: Absolutely. Oh, absolutely. Again, we've been trying to do this. We just haven't been able to get to it.

THE COURT: Ms. Woods?

MS. WOODS: I have no further questions at this time, your Honor.

THE COURT: Cross-examination, Mr. Stay?

MR. STAY: Thank you very much, your Honor.

CROSS-EXAMINATION

By Mr. Stay:

Q Nice to see you, Dr. Koenings.

A It's a pleasure to be here. We've done this before.

Q Haven't we, though? You're not an engineer, are you, Dr. Koenings?

A I am not.

Q Nor are you a hydrologist?

A I am not.

Q So you're not an expert in the design or operation of culverts?

A I am not.

Q As I understand it, there is -- we have limited factor assessments now in all of the watersheds?

[Original Page 104]

And the State may call their next witness.

MS. WOODS: Your Honor, the State will call Brian Benson.

THE COURT: Mr. Benson, I'll have you raise your right hand and be sworn.

Whereupon,

BRIAN BENSON

Called as a witness, having been first duly sworn, was examined and testified as follows:

THE CLERK: Please state your full name and spell your last name for the record.

THE WITNESS: Brian Benson, B-E-N-S-O-N.

THE COURT: Mr. Benson, there's water on your left if you need it.

You may inquire, Ms. Woods.

DIRECT EXAMINATION

By Ms. Woods:

Q Good afternoon, Mr. Benson.

A Good afternoon.

Q Mr. Benson, where do you work?

A I work for the Washington Department of Fish and Wildlife.

Q How long have you worked for the Washington Department of Fish and Wildlife?

[Original Page 105]

A Almost 29 years.

Q What are your current job responsibilities?

A Currently I'm an information technology specialist in the science division, which is part of the habitat program. My job responsibilities, I manage two fairly large natural resource databases. It involves design, construction, maintenance, updating, modifications. I'm responsible for creating and maintaining the GIS products that come out of those databases.

Q How long have you been doing that type of work?

A Probably started in the early 90s.

Q Would you please describe your educational background?

A I have a Bachelor of Science in marine resources from Huxley College of Environmental Studies at Western Washington University.

Q Do you have experience as a fish biologist?

A I have held that position, yes.

Q With the Washington Department of Fish and Wildlife?

A That's correct.

Q Is that before you began the database work that you've been doing now for a while?

A Yes, and kind of at the same time as well.

Q Mr. Benson, were you in the courtroom during the testimony of Tyson Waldo?

A Yes, I was.

Q Do you recall him using the acronym FPDSI?

[Original Page 106]

A Yes, I do.

Q What does FPDSI stand for?

A Fish Passage and Diversion Screening Inventory.

Q Is that a database?

A That is a database.

Q Who developed the Fish Passage and Diversion Screening Inventory Database?

A I did.

Q Why did you choose the title "Fish Passage and Diversion Screening Inventory"?

A Well, for one, it's reflective of the contents of the database. Also, it is hard to pronounce. Most database developers like to come up with names that have catchy acronyms, and I don't particularly care for that.

Q Is it okay if I use it -- if I call it the FPDSI?

A Yes.

Q Would you please describe the history of the FPDSI?

A Well, the predecessors to the FPDSI probably originated in the late 1980s and early 1990s. I started with the SHEAR program about 1996, and there were several independent databases being used to keep track of the various fish passage inventories and fishway inspection projects. There was just an ad hoc kind of table, essentially, that contained barrier information.

After I joined the division, we started the Thurston County inventory, which had its own database, and then the Jefferson

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County inventory, again, had a separate database. So in about '97, '98 when we started working on the manual, we decided to create a database to support the manual, and as part of that process, we would incorporate all the other independent databases into it. That database became known as SHEAR base, and it's undergone several iterations over the years and finally ended up being the FPDSI.

Q When you say "the manual," what are you talking about?

A That's the Fish Passage Barrier Assessment Manual.

Q Are you the person who currently maintains the FPDSI?

A Yes, I am.

Q What kinds of data does the FPDSI contain?

A It contains information on fish passage structures. It contains some information on surface water diversions. Relative to the fish passage information, it's got locational data. It's got specific descriptors of the various types of fish passage structures, whether they be culverts, dams, things like that, the habitat information, and the priority index information.

Q Does the data change over time?

A It changes on virtually a daily basis.

Q And why is that?

A Well, it's an active database. We have a lot of work going on with the DOT inventory crews. They come in and update and add data weekly. I add data on a fairly regular basis from inventory information coming in from non WDFW sources.

[Original Page 108]

Q About how many records for fish passage structures does the FPDSI have today?

A It has over 36,000.

Q About how many of those are human-made fish passage barriers?

A Around 11,500.

Q Of those 11,500, about what proportion are state owned?

A I guess it's just under 25 percent.

Q Does the FPDSI have records for every fish passage barrier in the state of Washington?

A It does not.

Q Why not?

A Well, several reasons. There are a number of large data sets that we don't have. We don't have DNR's data set incorporated. We don't have the Forest Service data set. We don't have the large commercial forest landowners information. There's just a lot of private and local governmental culverts out there that have not been assessed and inventoried.

Q Are the inventories for Washington State Department of Transportation culverts complete?

A I believe they are.

Q Are the inventories for Washington Department of Fish and Wildlife culverts complete in the case area?

A I believe so.

Q Is the inventory for state parks culverts complete?

A Not to my knowledge.

[Original page 109]

Q Has any complete inventory of non state culverts been done, to your knowledge?

A No.

[Original Page 115]

remaining pages in the exhibit and tell me if the remaining pages are all similar to Page 3 displayed on the screen.

A Yes, they are.

Q Do they display a similar type of information?

A Yes, they do.

Q Did you prepare any maps that illustrate non state-owned passage barriers upstream and downstream of the culverts that Tyson Waldo used for his analysis?

A Yes, I did.

MS. WOODS: Your Honor, I will be attempting to lay the foundation for 14 maps. I hope that we can streamline this a little bit.

THE COURT: Can you tell me what exhibit number they start with, Counsel?

MS. WOODS: 119.

By Ms. Woods:

Q Mr. Benson, are those maps in the same binder that you've already got, I hope?

A Yes.

Q I have up on the screen Exhibit W-119. Mr. Benson, did you prepare this exhibit?

A Yes, I did.

Q What is it?

A This is a map of Chico Creek, displaying the upstream and downstream barriers associated with a barrier taken from the list

[Original Page 123]

A Yes.

Q But your point isn't that the State doesn't have to fix theirs; it's just that there's a lot of other work that has to be done, right?

A That's correct.

Q And in order to achieve the benefit -- say the counties were to come in and really go out and fix that 1,370 barrier culverts, it wouldn't realize its full benefit, right, unless the State fixed their 315?

A That's correct.

Q And I believe in your Exhibit 88-C, you say there's 42 barriers with no other barrier in the watershed. And when I look at 133 and sort of go through, there's a couple of pages past this. I went through the columns of the grand total and looked for zeros, and I found about 77 of them.

Would that be my mistake or a change in the data set?

A I believe there may have been some qualifiers on the data that were used in the other table. I think there was a minimum of 200 lineal meters of habitat required upstream that would have to be included on that. This table here, that filter is not in place, so some of these that you see here may not have that 200 meters of habitat associated with them.

Q While we're on this page, I want you to take a look at site 102 L 062, where it says there's 140 other culverts in the watershed.

[Original Page 124]

That's Little Bear Creek, isn't it, one of the examples that Mr. Tomisser used in opening statements?

A I believe that's correct.

Q It is kind of an outlier, isn't it?

A It's a very high number.

Q In fact, it's the only culvert of the 315 that has 81 more sites associated than any other, is that correct? In the ballpark. I'll say I counted.

A Can you repeat that, please?

Q Little Bear Creek, the example used by Mr. Tomisser in his opening to illustrate his problem, is such an outlier, in fact, doesn't it have about 80 more sites associated than any other culvert in the examples? If you want to verify, you can scroll through -- go ahead and circle that first page where the 140 is. I'll attest to you that I verified that that was in fact the site ID for Little Bear Creek.

I don't find anything on the grand total that's anywhere near that particular example that Mr. Tomisser chose to use in his opening. Do you?

A No, you don't.

Q And in fact, you use this example because Counsel asked you to, right?

A That's correct.

Q Does Little Bear Creek, to your knowledge, have a high PI or a low PI?

[Original Page 137]

I'm going admit AT-323 and AT-324.

By Ms. Rasmussen:

Q I guess I'll have to use this one.

You created this spreadsheet; is that correct?

A Yes, I did.

Q And if you wanted to know -- I attested to you that the tribes have proposed in the pretrial order a

resolution whereby they're asking DOT to fix 90 percent of the habitat.

Would there be a way to find out, based on this analysis, what 90 percent of the habitat -- how many culverts that would mean?

A Which habitat metric are you referring to?

Q Well, if I understand correctly, this worksheet has "habitat gain" on it. It has "lineal gain" in Column M.

So you have "lineal gain" in column M, and that lineal gain is associated with fixing certain culverts. And have you another column that's the cumulative percentage of habitat? Is that the one in Column 0?

A "Cumulative percentage of lineal gain."

Q "Cumulative percentage of lineal gain." Well, how would you find out 90 percent? Since it is your spreadsheet, I won't embarrass myself by doing it for you.

A Well, you would go down the column until you reach the 90 percent value. That would correspond with a line that would give you the number of culverts associated with that value.

[Original Page 138]

Q I believe we've found the line. Can you scroll over and tell me how many culverts that would be?

Sorry, your Honor, it's a little different than the worksheet.

Let's go back to 323. Is there a way to find out what line culvert this is? When we printed it out, it did a numerical value for which culvert it was.

A I think you're corresponding to a value of 577 there.

Q Okay. So the sort number is that it would take, according to this worksheet, 577 of the 807 culverts with over 200 meters of habitat to get 90 percent of the habitat gain; is that correct?

A Based on the information that's in here. Again, you're mixing estimated with real data here, so you can't say for sure that that is exactly what you're going to end up with.

Q And when you say "estimated," you're referring to the SPI, not the EDT analysis which you referred to before as the non field verified?

A EDT is also an estimate.

Q Okay. And you use EDT frequently, correct?

A We don't use it that often anymore.

Q Does it amount to a large percent of the data or just a small percentage?

A I would say a smaller percent.

Q So your caveat here is that the SPI is based on this GIS exercise, so that it's not absolutely 577 exactly, which would

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yield 90 percent habitat gain; is that correct?

A That's correct.

Q And in order to know that for sure, you'd probably have to do these habitat assessments that the tribes are interested in having the department complete; is that correct?

A That's correct.

Q All right. But this would give you at least some sort of idea that the remedy that the tribes are seeking isn't all 807 of the culverts, should the department complete habitat surveys.

A That's correct.

Q And that would impact the total number that would need to be fixed at an accelerated schedule; is that correct?

A I believe so.

Q So unfortunately for me, I have another spreadsheet I'd like to ask you about, 168.

Do you know what the anadromous all PI 92 worksheet might be?

A Yes, I do.

Q Do you recognize this?

A I do.

Q And did you do this?

A Yes, I did.

Q And what does it represent?

A It's essentially the same as the previous spreadsheet; however – well, it's not essentially the same. It's the same site, same order. It doesn't have the calculated fields, the

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Q And you don't know why it has such a high PI?

A Well, there are many factors that go into the PI. It could be the amount of habitat, the potential habitat

gain. It could be the number of species that stand to benefit.

Q If I wanted to know the potential lineal gain from Little Bear Creek, what would I do?

A Potential lineal gain?

Q Yeah.

A Well, I would just follow the spreadsheet over to right there where it says "potential lineal gain."

Q And you don't recall if that's somewhere near 18 miles of habitat?

A I'd have to do the math. I don't report my stuff in miles typically.

Q But the examples -- suffice it to say that the examples of the maps you used, and I don't mean to beat a dead horse, were not randomly selected; they were selected because they had a high number of barriers, right? It wasn't a statistically valid sampling technique?

A It was -- yeah. The sites were not randomly selected.

Q The purpose was to drag out a bunch of examples where a lot of people were shirking; isn't that correct?

MS. WOODS: Objection as to form, your Honor.

MS. RASMUSSEN: Sorry. I've been reading "Horton Hears a Who."

October 26, 2009

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CROSS-EXAMINATION

BY MR. SLEDD:

Q Good morning, Mr. Moore. Mr. Tomisser reminded you of when we met, which was June 22nd, I believe, at your deposition?

A Yes.

Q I want to start out by going a little bit through your qualifications in the preparation of your declaration. I will not ask about your biological background.

Before you went to work for OFM in 1986, you did not have any experience working with state transportation budgets, did you?

A No.

Q And you worked as a budget analyst with transportation budgets for a few years, but that ended in 1991, I believe you said?

A Correct. Four years.

Q About 20 years ago?

A Correct.

Q When you were a budget analyst for Senate Ways and Means in 1983 and 1984, you did not work with the transportation budget?

A No.

Q And when you were with the House Appropriations Committee from 1991 to 2000, you did not work with the transportation

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budget and about 3 percent on the transportation capital?

A I think you're talking about the amount that the budget went down versus the amount that the revenue went down.

Q Oh, okay. But the general conclusion was that the general fund budget has been worse off than the state transportation budget?

A In terms of percentages, yes.

Q In terms of percentages of revenue and in terms of percentages of the expenditures that had to be cut as well?

A Right.

Q They go hand-in-hand?

A Correct.

Q I'd like to talk a little bit more with you about the general fund budget as compared to the transportation budget. If you're talking about funding for the Department of Transportation highway construction spending, it's the transportation budget that you're talking about, right, not the general fund budget?

A Correct.

Q The state general fund budget actually isn't that relevant to the DOT highway construction budget?

A No.

Q Because they're two separate budgets, two separate appropriation bills, and they have separate revenue sources?

A Correct.

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Q The general fund is basically you've got sales taxes, B&O, property tax. And on the transportation side, you've got license fees, fuel tax, correct?

A Correct.

Q So really, the only way the general fund budget would be relevant to highway construction program is if somebody wanted to take money from the general fund budget and use it to augment transportation spending, correct?

A For transportation-related uses, yes.

Q And are you aware of that ever having been done, where general fund money was taken and put into highway construction spending in the state of Washington?

A I'm not aware on the highway construction side. I think it happened for the ferry system at one point.

Q Once or twice in the 1990s?

A Yeah. In the mid 90s, yeah.

Q What I call the natural resource agencies and the landowning natural resource agencies, the DFW, Department of Fish and Wildlife, state parks, and the Department of Natural Resources, are they funded through the transportation budget?

A I think some of them receive a small amount of transportation funding if they have -- I think there's some road programs where Fish and Wildlife might receive some money. I'm not certain of others, but I think there is some limited transportation-related money to deal with roads

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MR. TOMISSER: Thank you. Nothing further, Your Honor.

THE COURT: Mr. Moore, thank you very much. You may step down, sir.

THE WITNESS: Thank you.

THE COURT: Nobody asked him what he thought of Tim Eynman while he was on the stand.

You may call your next witness.

MR. TOMISSER: Before I do that, Your Honor, if I might approach and hand the clerk the amended G before we lose track.

THE COURT: Thank you.

MR. TOMISSER: The state calls Mr. Jeff Carpenter.

THE COURT: Good morning, Mr. Carpenter. Raise your right hand to be sworn:

JEFF CARPENTER, HAVING BEEN FIRST DULY SWORN, TESTIFIED AS FOLLOWS:

THE CLERK: Could you please state your name for the record and spell your last name for our court reporter.

THE WITNESS: Jeff Carpenter, C-a-r-p-e-n-t-e-r.

THE COURT: You may inquire.

DIRECT EXAMINATION

BY MR. TOMISSER:

Q Good morning, Mr. Carpenter. Thanks for coming back. To get started here, could you describe for the court briefly

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both stream and anything carrying water across our highway.

And some of the measurement criteria is keeping it free of debris, routine inspection and cleaning, removal of beaver dams, should they be an issue for us. So on this, those are the criteria. And to get a C, we need 5 to 10 percent of our culverts, effectively, having issues. Anything more than that, we would be less than C; anything better, we'd be better than that particular grade. So each one of these elements has a similar measurement set.

Q So this broad category 282 for culvert, is that more culverts than just fish-bearing culverts?

A Yes. It's all culverts across the highway.

Q And so then when we look over the headings across the top of the sheet, do those refer to the various regional areas within the Department of Transportation around the state?

A Yes. Those are the regions that we designate in terms of our core response and how we manage our agency.

Q And so if we look at the northwest region and then read the grades, go down, what does that tell us? How do we read those grades in comparison to the target set by the legislature?

A Okay. So the northwest received an F-plus on culverts. And I had to ask because I didn't know what

the plus was either. The plus -- effectively, anything over 20 percent blockage receives a grade of F. So if it's 21 percent or 81

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passable would either be an improvement or a preservation project; is that correct?

A Correct.

Q So those would come out of the bottom half, the capital half of this budget?

A Uh-huh. Yes.

Q All right. Well, back to these budget numbers. The $20.3 million that the legislature apparently has appropriated for the culverts for this biennium, that's the highest amount that's ever been appropriated for that purpose, isn't it?

A I believe so.

Q And compared to the overall budget of the department, that -- well, let's see. How would we do that math? One percent of a billion dollars is ten million dollars; is that correct?

A Yes.

Q So maybe the simplest way to --

THE COURT: This is why I became a lawyer.

MR. JOHNSEN: This is exactly why I became a lawyer. I was planning on dealing with billions all the time.

Q (By Mr. Johnsen) Basically what we're going to do here is figure out what percentage of the overall budget the culvert appropriation consists of. You

would take 20.3 million, or figure 20.3, and divide it by whatever the total budget is, either 5.271 -- or excuse me, 5,271 or 5,800; is that correct?

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Q But it's not -- well, let me ask this question. Have you compared the characteristics of the projects on that list, the scoping list, with the list of 800 projects that remain to be done in the case area for the washed out fish passage culverts?

A No.

Q So you don't know whether the scoping list is in any way representative of the number of projects that remain to be done?

A No, not with what certainty.

Q Well, you have no basis for making a comparison because you haven't done a comparison; is that correct?

A All estimating we do is based on risk. And if we were asked by the legislature to give us a price, we would use the scoping list as the best available document to extrapolate from there, acknowledging that there could be variations in the estimates, and this is the best we have at that time.

Q But you've not been asked by the legislature to give an estimate of the -- no, that's okay. Never mind.

The center line miles graph, or whatever that was that was shown, the exhibit that was admitted earlier today, I take it that the center line on Interstate 5 is actually not a line on the road at all; it's just a length of the road from Vancouver to Blaine. Is that correct?

A There's no line in the road, no, sir. It's theoretic.

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THE CLERK: Would you please state your name for the record and spell your last name.

THE WITNESS: My name is Philip Roni. Last name is spelled R-o-n-i.

DIRECT EXAMINATION

BY MR. MONSON:

Q Good afternoon, Dr. Roni. Where are you employed?

A I'm employed at the Northwest Fisheries Science Center of NOAA Fisheries in Seattle, Washington.

Q What's your position there?

A I'm a research scientist and the watershed program manager.

Q What are your duties, first as a research scientist?

A Developing proposals, overseeing research, analyzing data, and publishing results of those studies.

Q What are your duties, generally speaking, as the watershed program manager?

A I lead up a program of about 25 research scientists. We do research on primarily freshwater and stream habitat for salmon. And so my duties there are I directly supervise about four people, and then there's three research teams, one that focuses on restoration effectiveness, one that focuses on ecosystem processes, and one that focuses on landscape ecology and recovery science. I'm also responsible for the budgeting for the entire program.

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Q When did you first begin working for the National Oceanic and Atmospheric Administration, which I'll often call NOAA?

A I began working for them in 1995.

Q And what position have you held at NOAA since you began in 1995?

A In 1995, I was hired as a research scientist to start up a freshwater habitat research team. And so initially – to lead up a research team. And also I served as the representative on the research and monitoring committee for the Northwest Forest Plan.

Then I was the team leader for the Instream Restoration Effectiveness Team, and then we became the watershed program in the year -- well, I became the manager of the watershed program about the year 2000.

Q Have you ever worked for the Washington Department of Fisheries or its successor, Department of Fish and Wildlife?

A Yes. In graduate school in 1990, I was actually – part of my research was funded by the Department of Fisheries, and I did some work for them to fund my research. I am a biologist too. But I was stationed at the University of Washington.

In 19- -- I guess I can look at my CV. I think in '93 or '94, I worked for the Department of Fisheries, which then became the Department of Fish and Wildlife, at the Brennon Shellfish Lab on the Hood Canal.

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your participation in these various groups, as well as your publications, would you consider yourself to be an expert in salmon habitat restoration and salmon recovery?

A Yes. Sorry, it feels a little odd to say that.

MR. MONSON: Your Honor, I move to qualify Dr. Roni as an expert under Rule 702.

THE COURT: Any objection?

MR. FERESTER: No objection, Your Honor.

Q (By Mr. Monson) Dr. Roni, were you present in the courtroom and did you hear Dr. Koenings' testimony regarding the four Hs?

A Yes, I did.

Q And those are habitat, hatchery, harvest and hydropower, right?

A Yes.

Q Do you have an opinion as to which of the four H's is the most important to salmon recovery in Western Washington in the case area?

A Yes. I mean, I think obviously in this case it starts with the habitat. I mean, that's really where a lot of the -- that's where the fish production comes from, and that's where a lot of effort is going to try to protect and restore those habitats, so I think that's the most important one.

Q Is there a difference between protecting habitat and

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restoring the habitat? Could you explain what that is?

A Sure. Well, protection -- first I should step back and say that often when we use the term "restoration," it's used in a very general sense to include things that include mitigation, habitat protection, as well as improvement of habitat.

Specifically protection, we usually -- while we lump that in with restoration activities, it usually involves either buying up habitat to protect it or getting conservation easements to protect it or in taking regulatory action or changing existing laws to further protect habitat.

Q I'm going to show you a page from that 2002 paper.

Do you recognize this diagram?

A Yes, I do.

Q Do you know who prepared it?

A Yes. I did, along with some input from the coauthors of the paper.

Q Dr. Roni, I'm going to focus a little bit on the upper left quadrant.

Do you see that area?

A Yes.

Q Can you explain generally what this flowchart diagram shows?

A So basically this flowchart is a combination of what we know about the effectiveness of different habitat restoration

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techniques and what we know about how they restore watershed processes, and it describes an initial way of

prioritizing restoration projects in the absence of very detailed limiting factors analyses. So it's a basic starting point for how to prioritize actions when you have some basic watershed assessment information.

Q Could you describe what the limiting factors analyses is?

A Sure. I think the little testimony that I've heard in this case, it seems like it's actually being misused from the standpoint of the way we tend to use it, at least the research scientists that I work with would use it.

A true limiting factors analyses is basically an analyses of the types of -- the habitat loss in the watershed, the different types of habitat, the fish production for each life stage of a particular species, to figure out exactly which life stage and which types of habitat are limiting the production of fish.

The classic paper on this is Beechie, et al, 1994, which was done for coho salmon in the Skagit River system. Often people refer to limiting -- we throw that term around, "limiting factor analyses" for things that are really just an assessment or a list of problems in the watershed.

But in my view, a true limiting factors analyses is trying to get at which -- as a detailed analysis trying to get at which life stage and which habitats are limiting that life

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stage for a particular salmon species.

Q Are true limiting factors analyses, in your judgment, available for all watersheds in the case area?

A No. To my knowledge, they've been done in Skagit for coho. I think they've done it for Chinook as well. It's been done on the Stillaguamish for coho. Most of the other watersheds, to my knowledge, have not done a limiting factors analyses.

The documents that are referred to as limiting factors analyses, I know that there was the -- I think it was Smith 2000 or 1999. Carol Smith had put together these limiting factors analyses for the different watersheds throughout the state. Those are really what we would consider just a synthesis of available information and a list of the key problems in the watershed. They're not necessarily identifying which of those habitat types or problems are limiting the production of salmon. So we have those for all the watersheds, but they're not what I would refer to as a limiting factors analyses.

Q Are limiting factors analyses specific to a particular species of salmon?

A Yes. They've been done most commonly for coho because we probably have the best information for that species, but it's species specific. So if you wanted to look at doing restoration actions for multiple species, you need to do one

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for each and then try to weigh those, because obviously the actions you might have meant for one species would differ from another.

Q Would the habitat needs for Chinook salmon be the same as for coho, for example?

A No. There would be a little bit of overlap, but they're quite different. So that's why the limiting factors analyses that have been done for the coho in the Skagit or the Stillaguamish are quite a bit different from those for, I think chinook they've done them for.

Q If you don't have a detailed true limiting factors analysis, as you've described it, you mentioned earlier that that reconnecting habitat is important.

Why is that?

A So what -- well, basically we came up with a system for prioritizing restoration actions based on if you didn't have a true limiting factors analysis, this was sort of an internal approach, this figure that you have up on the screen.

And so one of the first things that we -- that I and my coauthors would recommend that we do is that we focus on protecting high-quality habitat, and then the next thing would be reconnecting isolated habitats. So that would be pretty -- obviously this figure is a bit high.

Q Is there a pretty high probability of success through

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reconnecting habitat?

A Well, I think -- yeah. I mean, from the different restoration actions, it's one of the most successful for a couple of reasons. One is because it relies on existing habitat instead of trying to improve marginal or improve okay habitat.

Also what we see is that the fish colonize these areas very quickly, so it's one of the most successful from getting -- the response time is very quick, where some of the other techniques might take decades before we see response, or they might only last -- some of the other habitat improvement techniques might only last a few decades before we have to repeat.

Q When you say the response times is quick, what time period are you thinking of?

A Well, the studies that we've done and that others have done, I don't know that they've got it down to the day, but it's pretty clear that the fish would colonize the watersheds -- the area fairly quickly.

So there's -- we have one study that we've done on a stream down in Oregon where they removed small barriers, a dam of about 20 feet high, on a relatively small stream. And within a week of removing that dam, there were salmon that had moved up there, both juveniles and some adults. It's more akin to -- I think that one of the problems we have is

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we tend to think that it might take years for fish to colonize an area.

But I would say it's more akin to having a fenced backyard with a couple of dogs in it. And if you remove the fence, the dogs don't wait around a year to decide if they're going to go into the neighborhoods' yard. They go over there pretty quickly. So we really see fish moving into those areas pretty quickly.

Q Thank you. I'd like to have you turn your attention to Dr. Koenings' testimony, both his written testimony

and his testimony in court that you heard earlier during this trial.

I believe Dr. Koenings, and I'm just going to summarize his testimony, explained that the best way to recover salmon was to do -- address all of the Hs, so to speak, concurrently and do a little bit in all the sectors at the same time and work from the bottom up.

Is that a fair characterization of his testimony, as you recall it?

A I think that's what I heard, yes.

Q Do you agree with that approach?

A Not entirely.

Q Why not?

A I think that it's pretty clear that the habitat, the rest -- also implied in his answer is that with habitat restoration, we're going to address all the different factors

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at the same time. Starting with the four Hs, I think we need to start by focusing on habitat because that's where it all started and that's what it really depends on.

The other thing that made me uncomfortable about that was that again, it sounded like he was talking about we should do this sort of bottom up or, I should say, attack all -- try to address all the habitat problems at the same time. And that's largely, I think, what has been the failure of most previous salmon restoration or habitat restoration efforts, is doing a lot

of little things across the landscape and not really trying to address some of the key factors first.

Q Dr. Koenings also testified about the current efforts underway to restore salmon, and I think he mentioned the local -- the bottom-up approach, the local watershed councils and that sort of thing.

Are there -- do you have any disagreement with the notions of the bottom-up approach?

A Well, again, I think that what this has led to is lots of -- and this is partly from my experience on the recovery implementation technical team and partly my experience in working with different practitioners on evaluating restoration projects.

The bottom-up approach or the current approach we have leads to the different groups that are doing restoration actions proposing whatever they can get done, whatever they

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to get some of these areas.

Q Do you know if that approach has been criticized by other groups?

A Well, I think it's been -- I mean, it's been criticized. I mean, this is a topic of discussion in the recovery implementation technical team in Puget Sound and the other recovery implementation technical teams that NOAA has set up in different parts of the Northwest here. It also was – I mean, I think back when the state prepared their "Extinction is Not an Option" report, the independent science review panel reviewed that and basically criticized it very heavily

because it relied on voluntary efforts and that those type of efforts have not been successful.

So I think there's a history of the scientific community criticizing the recovery plans for relying on voluntary efforts.

Q Turning your attention, Dr. Roni, to restoring the connectivity to isolated habitats, does it matter if the upstream habitat that has opened up is a very high quality or a moderate quality? Does that play a role in deciding whether to open up that area?

A Well, I think historically, you know, that was one of the factors that was considered most important. In our more recent research where we've evaluated barrier removals, we see that really the amount of habitat is probably – assuming

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the habitat is okay or even marginal, the amount seems to be more important than the actual quality. And the example I would give there is the Cedar River Watershed where we've been monitoring the Landsburg Diversion Dam. City of Seattle water supply has blocked fish access there for about a hundred years. And about five or six years ago, they put a fish ladder on that, and we've been monitoring the recolonization of the fish in that watershed.

And while it's in a protected area, the whole watershed was probably logged probably 50 years ago, and it's not particularly high quality habitat, it's okay, but we've seen fish colonize it fairly rapidly, both juveniles and adults. So that and a few other studies are really suggesting that if you give them the access

and the habitat is even marginal or okay quality, they'll colonize it fairly quickly.

Again, I would use the dogs in the backyard example, where I think the salmon are -- they move around a lot. And so it's not like -- again, you know, if you remove the fence, your dog's not going to wonder whether the yard next door is suitable. He's going to go over there. And it seems to be the same for both juvenile and adult salmon. They move around a lot at certain times of the year and explore different habitats.

Q Dr. Koenings in his testimony talked about the interrelationship between hatchery fish and wild fish.

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fish to recolonize those areas.

So I think in many of the watersheds where we have mixed production, you know, that's what we're -- I guess I don't see the hatchery fish as a problem. We're already relying on them for some of the recolonization and recovery.

Q Some have argued that if there are other culverts, for example, on a stream that are partial barriers or even full barriers to salmon, that it would be perhaps not the best use of funds to spend money to correct an upstream state-owned culvert, for example.

Do you agree with that?

A I think the -- well, many times these culverts are partial barriers. So my concern would be that if we didn't replace a state-owned culvert because there was a downstream fish passage barrier or a partial

barrier, then we would be foregoing habitat that is used sometimes already.

Also from just experience in working with some of the restoration practitioners, in particularly I worked a lot with the Bureau of Land Management down in Oregon, they – to get private landowners to agree to restoration actions or the removal of culverts on their land, they basically demonstrate -- they get the landowners to go along by taking care of their culverts and their restoration first and then work with the landowners to try and get them to get theirs as well.

So I think it would be -- that's not necessarily a

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technical issue, but it's sort of from a leverage standpoint of trying to get those restoration actions, it's sort of important for the feds and the states to demonstrate.

Q To act as role models, then, in effect?

A I would think so.

Q Okay. Dr. Koenings also discussed the effect of climate change. And I believe he discussed that in relationship to state-owned culverts, for example.

What is your view on whether the climate change should be a basis for accelerating the repair of culverts or not accelerating the repair of culverts?

A So I think that the predictions for climate change are obviously that we're going to see changes in stream flows and changes in stream temperature. And in terms of restoration actions -- and actually, myself and Dr. Beechie have been working on a paper to talk

about how to address restoration under climate change, which types of actions you might do.

And obviously, the critical thing is if we're going to see changes in water temperature, we need to have -- we need to make sure that the fish have access to all these different habitats that they might use; that they have access to some of the upstream habitats where usually the water temperature is lower. So one of the best things under a climate change scenario is to make sure that we're -- all the habitats are connected and the fish have access. Because otherwise, if

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the temperature's going up, they're not going to be able to move into the cool water refuges.

Q So they need more habitat rather than less?

A Yeah. Well, more, and access to those habitats.

Q In his testimony, both his written testimony and I believe on the stand, Dr. Koenings discussed the entire four H process, and we need to address all of the Hs and so forth.

I was left at least with the implication that there's necessarily a tradeoff between, say, correcting state-owned culverts on Department of Transportation roads and correcting hatchery management actions or habitat management actions?

Do you see any kind of tradeoff in that regard?

A Between -- the tradeoff --

Q Between restoring connectivity by fixing culverts on state-owned roads and that necessarily reduce the

amount of effort that would be devoted to corrections in the other Hs?

A I don't think so. I mean, it seems that the discussion is mainly over what types of habitat restoration would be funded, as the funds are -- the funds that are being used for habitat restoration are not coming from the same sources. And most of these other activities that we've been discussing are already being addressed through other processes.

Q Okay. Thank you.

Earlier in this trial, the court has asked prior witnesses what they would do if there was a new bushel of

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money that dropped out of the sky, I believe, and what would they do differently, what would they do the same with respect to habitat restoration.

Would your approach to habitat restoration activities, your suggested approach focus in on, for example, restoring connectivity, would that change if more money was available?

A Well, yes and no. I think that we would – initially because it's going to take some time to do kinds of proper assessments and limiting factors analyses in each watershed, that we would go with our interim approach that we've proposed and focus on, you know, protecting the high-quality habitats, reconnecting the isolated habitats, because that's -- again, we know the response time is quick, and it's been shown to be critical for a number of listed salmon species, if that's what we've lost, habitat. And then focus on some of these other restoration of other watershed processes,

like the delivery of wood, water and sediment. And then once we had -- so that would be the initial approach.

And then as we complete the limiting factors analyses, we can refine that, change that, and focus in on things that would be most important for the particular species of interest.

Q Now, as we heard this morning in testimony from the Department of Transportation, this funding isn't inexhaustible. There are some limitations to funding. We

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all know that from our personal lives as well as the current economy.

If money is limited, would your priorities be as you suggested?

A Yeah. I think we're in the same situation, because I don't think we can -- we can't necessarily stop to spend all our money doing limiting factors analyses. So we would follow the same approach until we get some other information that suggests otherwise.

Q And so that would involve still correcting the barriers to fish passage, reconnecting habitats, for example?

A Yeah. So I think the starting points are obviously protecting habitat, and that's been borne out in the literature and conservation biology for years, that we have to protect the good stuff and stem the tide of habitat loss, and then focus on reconnecting isolated habitats. Some of that would be culverts and those types of barriers. Some of that might be removing

levies or dikes to isolated areas for habitats is important for different species.

MR. MONSON: Thank you.

Your Honor, may I have a moment to consult with counsel? I believe I might be through. Your Honor, I have no further questions of this witness on direct. Thank you.

THE COURT: Cross-examination, Mr. Ferester?

MR. FERESTER: Your Honor, first I'd like to address

FRANKLIN PIERCE,

Dec. 26, 1854

PRESIDENT OF THE UNITED STATES OF AMERICA,

TO ALL AND SINGULAR TO WHOM THESE PRESENTS SHALL COME, GREETING:

Title

WHEREAS a treaty was made and concluded on the She-nah-nam, or Medicine Creek, in the Territory of Washington, on the twenty-sixth day of December, one thousand eight hundred and · fifty-four, between the United States of America and the Nisqually and other bands of Indians, which treaty is in the words following, to wit:—

Articles of agreement and convention made and concluded on the She- nah-nam, or Medicine Creek, in the Territory of Washington, this twenty-sixth-day of December, in the year one thousand eight hundred and fifty- four, by Isaac I. Stevens, governor and superintenddent of Indian affairs of the said Territory, on the part of the United States, and the under-signed chiefs, headmen, and delegates of the Nisqually, Puyallup, Steilacoom, Squawksin, S'Homamish, Steh-chass, T'Peeksin, Squi-aitl, and Saheh-wamish tribes and bands of Indians, occupying the lands lying round the head of Puget's Sound and the adjacent inlets, who, for the purpose of this treaty, are to

be regarded as one nation, on behalf of said tribes and bands, and duly authorized by them.

Cession to United States.

ARTICLE I. The said tribes and bands of Indians hereby cede, relinquish, and convey to the United States, all their right, title, and interest in and to the lands and country occupied by them, bounded and described as follows, to wit: Commencing at the point on the eastern side of Admiralty Inlet, known as Point Pully, about midway between Commencement and Elliott bays ; thence running in a southeasterly direction, following the divide between the waters of the Puyallup and Dwamish, or White rivers, to the summit of the Cascade Mountains ; thence southerly, along the summit of said range, to a point opposite the main source of the Skookum Chuck Creek ; thence to and down said creek, to the coal mine ; thence northwesterly, to the summit of the Black Hills ; thence northerly, to the upper forks of the Satsop River ; thence northeasterly, through the portage known as Wilkes's Portage, to Point Southworth, on the western side of Admiralty Inlet ; thence around the foot of Vashon's Island, easterly and southeasterly, to the place of beginning.

Reservation for

ARTICLE II. There is, however, reserved for the present use and occupation of the said tribes and bands, the following tracts of land, viz : The small

said tribes.

island called Klah-che-min, situated opposite the mouths of Hammersley's and Totten's inlets, and separated from Hartstene Island by Peale's Passage, containing about two sections of land by estimation; a square tract containing two sections, or twelve hundred and eighty acres, on Puget's Sound, near the mouth of the She-nah-nam Creek, one mile west of the meridian line of the United States land survey, and a square tract containing two sections, or twelve hundred and eighty acres, lying on the south side of Commencement Bay; all which tracts shall be set apart, and, so far as necessary, surveyed and marked out for their exclusive use ; nor shall any white man be permitted to reside upon the same without permission of the tribe and the superintendent or agent. And the said tribes and bands agree to remove to and settle upon the same within one year after the ratification of this treaty, or sooner if the means are furnished them. In the mean time, it shall be lawful for them to reside upon any ground not in the actual claim and occupation of citizens of the United States, and upon any ground claimed or occupied, if with the permission of the owner or claimant. If necessary for the public convenience, roads may be run through their reserves, and, on the other hand, the right of way with free access

Removal thereto.

Roads may be constructed.

from the same to the nearest public highway is secured to them.

Right to fish.

ARTICLE III. The right of taking fish, at all usual and accustomed grounds and stations, is further secured to said Indians, in common with all citizens of the Territory, and of erecting temporary houses for the purpose of curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses on open and unclaimed lands: *Provided, however,* That they shall not take shell fish from any beds staked or cultivated by citizens, and that they shall alter all stallions not intended for breeding horses, and shall keep up and confine the latter.

Payments for said cession.

ARTICLE IV. In consideration of the above cession, the United States agree to pay to the said tribes and bands the sum of thirty-two thousand five hundred dollars, in the following manner, that is to say: For first year after the ratification hereof, three thousand two hundred and fifty dollars ; for the next two years, three thousand dollars each year ; for the next three years two thousand dollars each year ; for the next four years fifteen hundred dollars each year ; for the next five years twelve hundred dollars each year, and for the next five years one thousand dollars each year ; all which said sums of money shall be applied to the use and benefit of the said Indians, under the

How applied.

direction of the President of the United States, who may from time to time determine, at his discretion, upon what beneficial objects to expend the same. And the superintendent of Indian affairs, or other proper officer, shall each year inform the President of the wishes of said Indians in respect thereto.

Expense of removal, &c.

ARTICLE V. To enable the said Indians to remove to and settle upon their aforesaid reservations, and to clear, fence, and break up a sufficient quantity of land for cultivation, the United States further agree to pay the sum of three thousand two hundred and fifty dollars, to be laid out and expended under the direction of the President, and in such manner as he shall approve.

Removal from said reservation.

ARTICLE VI. The President may hereafter, when in his opinion the interests of the Territory may require, and the welfare of the said Indians be promoted, remove them from either or all of said reservations to such other suitable place or places within said Territory as he may deem fit, on remunerating them for their improvements and the expenses of their removal, or may consolidate them with other friendly tribes or bands. And he may further, at his discretion, cause the whole or any portion of the lands hereby reserved, or of such other land as may be selected in lieu thereof, to be surveyed into lots, and assign the same to such individ-

uals or families as are willing to avail themselves of the privilege, and will locate on the same as a permanent home, on the same terms and subject to the same regulations as are provided in the sixth article of the treaty with the Omahas, so far as the same may be applicable. Any substantial improvements heretofore made by any Indian, and which he shall be compelled to abandon in consequence of this treaty, shall be valued under the direction of the President, and payment be made accordingly therefor.

Annuities not to be taken for debts.

ARTICLE VII. The annuities of the aforesaid tribes and bands shall not be taken to pay the debts of individuals.

Stipulations respecting conduct of Indians.

ARTICLE VIII. The aforesaid tribes and bands acknowledge their dependence on the government of the United States, and promise to be friendly with all citizens thereof, and pledge themselves to commit no depredations on the property of such citizens. And should any one or more of them violate this pledge, and the fact be satisfactorily proved before the agent, the property taken shall be returned, or in default thereof, or if injured or destroyed, compensation may be made by the government out of their annuities. Nor will they make war on any other tribe except in self-defence, but will submit all matters of difference between them and other Indians to the government of the United States, or its agent, for decision,

and abide thereby. And if any of the said Indians commit any depredations on any other Indians within the Territory, the same rule shall prevail as that prescribed in this article, in cases of depredations against citizens. And the said tribes agree not to shelter or conceal offenders against the laws of the United States, but to deliver them up to the authorities for trial.

ARTICLE IX: The above tribes and bands are desirous to exclude from their reservations the use of ardent spirits, and to prevent their people from drinking the same ; and, therefore, it is provided, that any Indian belonging to said tribes, who is guilty of bringing liquor into said reservations, or who drinks liquor, may have his or her proportion of the annuities withheld from him or her for such time as the President may determine.

Intemperance.

ARTICLE X. The United States further agree to establish at the general agency for the district of Puget's Sound, within one year from the ratification hereof, and to support, for a period of twenty years, an agricultural and industrial school, to be free to children of the said tribes and bands, in common with those of the other tribes of said district, and to provide the said school with a suitable instructor or instructors, and also to provide a smithy and carpenter's shop, and furnish them with the necessary tools, and employ a blacksmith, carpenter, and

Schools, shops, &c.

farmer, for the term of twenty years, to instruct the Indians in their respective occupations. And the United States further agree to employ a physician to reside at the said central agency, who shall furnish medicine and advice to their sick, and shall vaccinate them ; the expenses of the said school, shops, employees, and medical attendance, to be defrayed by the United States, and not deducted from the annuities.

Slaves to be freed.

ARTICLE XI. The said tribes and bands agree to free all slaves now held by them, and not to purchase or acquire others hereafter.

Trade out of the limits of the U.S. forbidden.

Foreign Indians not to reside on reservetion.

ARTICLE XII. The said tribes and bands finally agree not to trade at Vancouver's Island, or elsewhere out of the dominions of the United States; nor shall foreign Indians be permitted to reside in their reservations without consent of the superintendent or agent.

Treaty, when to take effect.

ARTICLE XIII. This treaty shall be obligatory on the contracting parties as soon as the same shall be ratified by the President and Senate of the United States.

In testimony whereof, the said Isaac I. Stevens, governor and superintendent of Indian Affairs, and the

undersigned chiefs, headmen, and delegates of the aforesaid tribes and bands, have hereunto set their hands and seals at the place and on the day and year hereinbefore written.

ISAAC I. STEVENS, [L. S.]

Governor and Superintendent Territory of Washington.

QUI-EE-METL,	his x mark. [L. S.]
SNO-HO-DUMSET,	his x mark. [L. S.]
LESH-HIGH,	his x mark. [L. S.]
SLIP-O-ELM,	his x mark. [L. S.]
KWI-ATS,	his x mark. [L. S.]
STEE-HIGH,	his x mark. [L. S.]
DI-A-KEH,	his x mark. [L. S.]
HI-TEN,	his x mark. [L. S.]
SQUA-TA-HUN,	his x mark. [L. S.]
KAHK-TSE-MIN,	his x mark. [L. S.]
SONAN-O-YUTL,	his x mark. [L. S.]
KL-TEHP,	his x mark. [L. S.]
SAHL-KO-MIN,	his x mark. [L. S.]
T'BET-STE-HEH-BIT,	his x mark. [L. S.]
TCHA-HOOS-TAN,	his x mark. [L. S.]
KE-CHA-HAT,	his x mark. [L. S.]
SPEE-PEH,	his x mark. [L. S.]

SWE-YAH-TUM, his x mark. [L. S.]
CHAH-ACHSH, his x mark. [L. S.]
PICH-KEHD, his x mark. [L. S.]
S'KLAH-O-SUM, his x mark. [L. S.]
SAH-LE-TATL, his x mark. [L. S.]
SEE-LUP, his x mark. [L. S.]
E-LA-KAH-KA, his x mark. [L. S.]
SLUG-YEH, his x mark. [L. S.]
HI-NUK, his x mark. [L. S.]
MA-MO-NISH, his x mark. [L. S.]
CHEELS, his x mark. [L. S.]
KNUTCANU, his x mark. [L. S.]
BATS-TA-KOBE, his x mark. [L. S.]
WIN-NE-YA, his x mark. [L. S.]
KLO-OUT, his x mark. [L. S.]
SE-UCH-KA-NAM, his x mark. [L. S.]
SKE-MAH-HAN, his x mark. [L. S.]
WUTS-UN-A-PUM, his x mark. [L. S.]
QUUTS-A-TADM, his x mark. [L. S.]
QUUT-A-HEH-MTSN, his x mark. [L. S.]
YAH-LEH-CHN, his x mark. [L. S.]
TO-LAHL-KUT, his x mark. [L. S.]
YUL-LOUT, his x mark. [L. S.]
SEE-AHTS-OOT-SOOT, his x mark. [L. S.]

YE-TAHKO,	his x mark. [L. S.]
WE-PO-IT-EE,	his x mark. [L. S.]
KAH-SLD,	his x mark. [L. S.]
LA'H-HOM-KAN,	his x mark. [L. S.]
PAH-HOW-AT-ISH,	his x mark. [L. S.]
SWE-YEHM,	his x mark. [L. S.]
SAH-HWILL,	his x mark. [L. S.]
SE-KWAHT,	his x mark. [L. S.]
KAH-HUM-KLT,	his x mark. [L. S.]
YAH-KWO-BAH,	his x mark. [L. S.]
WUT-SAH-LE-WUN,	his x mark. [L. S.]
SAH-BA-HAT,	his x mark. [L. S.]
TEL-E-KISH,	his x mark. [L. S.]
SWE-KEH-NAM,	his x mark. [L. S.]
SIT-OO-AH,	his x mark. [L. S.]
KO-QUEL-A-CUT,	his x mark. [L. S.]
JACK,	his x mark. [L. S.]
KEH-KISE-BE-LO,	his x mark. [L. S.]
GO-YEH-HN,	his x mark. [L. S.]
SAH-PUTSH,	his x mark. [L. S.]
WILLIAM,	his x mark. [L. S.]

Executed in the presence of us : —

M. T. Simmons,
Indian Agent.

JAMES DOTY
Secretary of the Commission.

C. H. MASON,
Secretary Washington Territory.

W. A. SLAUGHTER,
1st Lieut. 4th Infantry.

JAMES MCALISTER,

E. GIDDINGS, jr.,

GEORGE SHAZER,

HENRY D. COCK,

S. S. FORD, jr.,

JOHN W. McALISTER,

CLOVINGTON CUSHMAN,

PETER ANDERSON,

SAMUEL KLADY,

W. H. PULLEN,

P. O. HOUGH,

E. R. TYERALL,

GEORGE GIBBS,

BENJ. F. SHAW, *Interpreter*,

HAZARD STEVENS.

And whereas the said treaty having been submitted to the Senate of the United States, for its constitutional action thereon, the Senate did, on the third day of March, one thousand eight hundred and fifty-five, advise and consent to the ratification of its articles by a resolution in the words and figures following, to wit : —

"IN EXECUTIVE SESSION, SENATE OF THE UNITED STATES,

"March 3, 1855.

"*Resolved*, (two thirds of the senators present concurring,) That the Senate advise and consent to the ratification of the articles of agreement and convention made and concluded on the She-nah-nam, or Medicine Creek, in the Territory of Washington, this twenty-sixth day of December, in the year one thousand eight hundred and fifty-four, by Isaac I. Stevens, governor and superintendent of Indian affairs of the said Territory, on the part of the United States, and the undersigned chiefs, headmen, and delegates of the Nisqually, Puyallup, Steilacoom, Squawksin, S'Hom-amish, Steth-chass, T'Peeksin, Squi-aitl, and Sa-heh-wamish tribes and bands of Indians occupying the lands lying round the head of Puget's Sound and the adjacent inlets, who, for the purpose of this treaty, are to be regarded as one nation, on behalf of said

tribes and bands, and duly authorized by them.

"Attest : ASBURY DICKINS,

"Secretary."

Now, therefore, be it known that I, FRANKLIN PIERCE, President of the United States of America, do, in pursuance of the advice and consent of the Senate, as expressed in their resolution of the third day of March, one thousand eight hundred and fifty-five, accept, ratify, and confirm the said treaty.

In testimony whereof, I have caused the seal of the United States to be hereto affixed, having signed the same with my hand.

[L. S.] Done at the city of Washington, this tenth day of April, in the year of our Lord one thousand eight hundred and fifty-five, and of the independence of the United States the seventy-ninth.

FRANKLIN PIERCE

by the President :
W. L. MARCY, *Secretary of State.*

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Snohomish, and Suquamish
Indian Tribes

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT TACOMA

UNITED STATES OF AMERICA Plaintiff and QUILEUTE, MAKAH, LUMMI, MUCKLESHOOT, SQUAXIN ISLAND, SKOKOMISH, LOWER ELWHA, SNOQUALMIE, DUWAMISH, YAKIMA, STILLAGUAMISH, SAUK-SUIATTLE, HOH, NISQUALLY, SWINOMISH, TULALIP, PUYALLUP, QUINAULT, UPPER SKAGIT, NOOKSACK, STEILACOOM, SUQUAMISH, SAMISH, SNOHOMISH, SWINOMISH, PORT GAMBLE AND SNOQUALMIE INDIAN TRIBES Plaintiff-Intervenors vs. STATE OF WASHINGTON Defendant and STATE OF WASHINGTON DEPARTMENT OF FISHERIES and STATE OF WASHINGTON DEPARTMENT OF GAME Defendant-Intervenors.	CIVIL NO. 9 2 1 3 AMENDED AND SUPPLEMENTAL COMPLAINT FOR DECLARATORY JUDGMENT

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SEP 29 1976
DEPARTMENT OF GAME
ATTORNEY GENERAL'S OFFICE

JURISDICTION

This amended complaint is supplemental to the complaint filed by Plaintiff United States and Plaintiff Indian Tribes at

[Original Page 4]

The economic development of the State, the growth of the State's non-Indian population and the agricultural and industrial advances of recent times, have resulted in a fishery vastly different from the fishery existing at the time of the treaties which was primarily an Indian fishery. The size and nature of fish populations have been substantially altered by numerous activities impairing or destroying the acquatic habitats necessary to maintain them. Whole watersheds have been rearranged or destroyed to make room for development; fresh and saltwater systems have been polluted and subjected to changes in flow, level velocity and temperature; migration routes have been restricted or blocked; spawning beds have been damaged or destroyed; artificially introduced fish populations have displaced native populations; predator and disease problems have been aggravated; and generally the ecological balance necessary to maintain the Indian fishery has been seriously tampered with. This destruction or alteration of fish habitats could have been controlled or prevented in part by the Defendant State and its agencies, but was not. Much of it actually occurred pursuant to explicit administrative authorization contained in State-issued permits and approvals.

During this same period of growth, a large non-Indian commercial fishery came into being, providing employment and economic opportunities for a substantial portion of the citizenry. The increasing demands of this commerical fishery have threatened the survival of the resource. An expanding sport fishery has further increased this pressure. The Defendant State, at all times prior to this Court's Final Decision No. 1, has had the power to prevent the substantial diminution of the fishery resource by limiting sporting and commerical licensing, but has elected not to do so.

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UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON

UNITED STATES OF AMERICA Plaintiff and QUILEUTE, MAKAH, LUMMI, MUCKLESHOOT, SQUAXIN ISLAND, SKOKOMISH, LOWER ELWHA, SNOQUALMIE, DUWAMISH, STILLAGUAMISH, SAUK-SUIATTLE, NISQUALLY, SWINOMISH, TULALIP, PUYALLUP, QUINAULT, UPPER SKAGIT, YAKIMA, NOOKSACK, STEILACOOM, SAMISH, SNOHOMISH, and PORT GAMBLE CLALLAM INDIAN TRIBES Plaintiff-Intervenors, vs. STATE OF WASHINGTON Defendant and STATE OF WASHINGTON DEPARTMENT OF FISHERIES and STATE OF WASHINGTON DEPARTMENT OF GAME Defendant-Intervenors.	CIVIL NO. 9213 AMENDED AND SUPPLEMENTAL COMPLAINT FOR DECLARATORY JUDGMENT

JURISDICTION

This amended complaint is supplemental to the complaints filed by Plaintiff United States and Plaintiff Indian Tribes at the commencement of this lawsuit or in intervention, and is filed at the specific request of this Court made in June of 1976. Trial of

[Original Page 4]

State's non-Indian population and the agricultural and industrial advances of recent times, have resulted in a fishery vastly different from the fishery existing at the time of the treaties which was primarily an Indian fishery. The size and nature of fish populations have been substantially altered by numerous activities impairing or destroying the aquatic habitats necessary to maintain them. Whole watersheds have been rearranged or destroyed to make room for development; fresh and saltwater systems have been polluted and subjected to changes in flow, level, velocity and temperature; migration routes have been restricted or blocked; spawning beds have been damaged or destroyed; artificially introduced fish populations have displaced native populations; predator and disease problems have been aggravated; and generally the ecological balance necessary to maintain the Indian fishery has been seriously tampered with. This destruction or alteration of fish habitats could have been controlled or prevented in part by the Defendant State and its agencies, but was not. Much of it actually occurred pursuant to explicit administrative authorization contained in State-issued permits and approvals.

During this same period of growth, a large non-Indian commercial fishery came into being, providing employment and economic opportunities for a substantial portion of the citizenry. The increasing demands of this commercial fishery have threatened the survival of the resource. An expanding sport fishery has further increased this pressure. The Defendant State, at all times prior to this Court's Final Decision No. 1, has had the power to prevent the substantial diminution of the fishery resource by limiting sporting and commercial licensing, but has elected not to do so.

[Original Page 1]

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON

UNITED STATES OF AMERICA, et al., Plaintiffs, v. STATE OF WASHINGTON, et al., Defendants.	NO. 9213-II PLAINTIFF'S SUPPLEMENTAL MEMORANDUM IN SUPPORT OF MOTION FOR PARTIAL SUMMARY JUDGMENT

Plaintiff, United States of America, hereby submits its Supplemental Memorandum in Support of Motion For Partial Summary Judgment.

I

INTRODUCTION

In our initial memorandum we contend that the Federal treaty fishing right involved in this litigation reserves to treaty tribes a right to have the fishery resource protected from adverse environmental actions or inactions of the State of Washington. In support of that contention we set forth and substantiated several arguments: that the treaty fishing right recognized in Final Decision No. 1 presupposes a measure of environmental protection for the salmon/steelhead resource; that the treaties must be construed to effect the purposes for which they were signed; that

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described in general (see e.g., 01 - Nooksack - 01 to 05). The major streams within the WRIA are then described and illustrated with photographs and maps. Both the general description of the WRIA and the specific stream descriptions contain a section entitled "Limiting Factors." According to the Catalog:

> Limiting factors refer to conditions that lead to a complete loss or reduction of the environment's fish producing potential, excluding harvest or exploitation. They include only those conditions presently considered alterable.

The tribal watershed reports are also geographical. They do not track the Stream Catalog exactly because the location of the tribes did not correspond with the WRIA delineations. The watershed reports do, however, include WRIA numbers and stream numbers which correspond to the Stream Catalog system. Thus, by reviewing the Stream Catalog and the watershed reports, one is able to get a geographical perception of the extent to which man's activities are impacting the waterways of the case area.

Because of the geographical approach of the Stream Catalog and the watershed reports, the discussion which follows will focus instead on the different types of habit-affecting activity and the extent to which those activities are currently impacting the case area. The activities which we will explore include: logging, culvert placement, dams and other obstructions, channelization, gravel removal, livestock, agriculture, water withdrawal, urbanization, estuarine development, water pollution, and removal of streamside cover. The division of habitat-impacting activity into categories is, of course, somewhat arbitrary. When a logging company fails to provide an adequate streamside buffer zone, and, as a result, a salmon stream receives excessive silt, the resultant impact can be labeled "water pollution" as well as

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"logging." Likewise, the destruction of a stream bank by grazing cattle can as easily be described as "removal of streamside cover" as "livestock." We have tried, however, to create categories which would separate and reflect the most significant types of activity taking place. In other words, logging could be included in removal of streamside cover and water pollution, but we felt that as an activity, it is significant enough to merit its own section. Thus, while there is undoubted overlap, we have attempted to define the activities in such a way so as to make them mutually exclusive.

1. Dams and Other Obstructions.

This category includes any[38/] man-made structure which constitutes a total or partial barrier to migrating salmon or steelhead. It also includes a dam which, while not impeding migration, causes other adverse impacts upon the resource, such as low flows, flow fluctuations, nitrogen supersaturation, etc.

Without question, dams and other man-made obstructions have had greater impact on salmon and steelhead runs than any other single type of environmental activity. The JBS states that "[t]he most dramatic change, often causing a complete loss of the salmon and steelhead environment on stream systems in Washington State, is the series of dams which has been completed in the last 40 years." PE-3, p. 23. See, complete discussion, Id. at 23-25. The Stream Catalog noted:

> The construction of dams on major rivers and streams for hydropower and storage or for creation of a lake or reservoir for land real estate

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38/ The figures which we use and the examples which we cite are meant to exclude Federal, federally-licensed and tribal activities.

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The tribal watershed reports identified 499 incidents of habitat damage due to channelization. PE-37 through PE-51. According to those reports, the impact of channelization is being especially felt on the Nooksack River, Squalicum Creek, and Whatcom Creek (PE-37); the Skagit River (PE-38); Montague Creek and French Creek (PE-39); Thornton Creek, McAleer Creek, Lyon Creek, Issaquah Creek, Juanita Creek, and especially the Cedar River (PE-40); the Puyallup River (eighteen miles channelized -- PE-42); the Skokomish River (PE-45); and the Hoh River (PE-49).

4. Culverts.

We use the term "culvert" to refer to any pipe, conduit, tunneled drain, arched passageway, or other waterway constructed to convey water across or beneath a street, highway, railway, parking lot, or similar area.

Since culverts convey water and thus become a part of the case area waterways, improper culvert placement, size, or gradient will prevent the upstream migration of salmon and steelhead.

Culverts are rarely identified as limiting factors in the Stream Catalog. See e.g., PE-3, 19 - Lyre Hoko - 601; 20 - Soleduck Hoh - 05, 401, 1101, 1701.

The improper placement of culverts is, however, a chronic problem in streams supporting migratory fish. The watershed reports list 136 improperly placed culverts which currently exist in the case area. PE-37 through PE-51.

5. Gravel Removal.

According to the Department of Fisheries Stream Catalog:

> Removal of riverbed materials, particularly gravel, results in reduced spawning areas and causes continuous and excessive bed load